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Spatial Allocation Factor Procedures for the 1980 NAPAP (National Acid Precipitation Assessment Program) Emissions Inventory Documentation

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DOCUMENTATION OF SPATIAL ALLOCATION FACTOR PROCEDURES FOR THE 1980 NAPAP EMISSIONS INVENTORY

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ABSTRACT

The 1980 NAPAP Emissions Inventory has been developed by the National Acid Precipitation Assessment Program's (NAPAP) Task Group on Emissions and Controls. To create modeling inventories in support and testing of the Regional Acid Deposition Model (RADM) and the Regional Oxidant Model (ROM), temporal, spatial, and pollutant species allocation factors were developed. This report summarizes spatial allocation factor development for area source emissions and documents the software and files used to create the factors.

The goal of the spatial allocation factor development effort was to create as many spatial surrogates as possible for each county to allow the user maximum flexibility in assigning county-level area source emissions to modeling grid cells. The surrogates are used to represent the subcounty distribution of area source emissions for each emissions category. Fourteen surrogate indicators were developed for use with the NAPAP inventory based on housing, population, and land use data. Once the subcounty distribution of each surrogate is determined, area source emissions categories are matched to the most appropriate surrogate indicators. The resultant Spatial Allocation Factor File is input to the Spatial Allocation Module of the Flexible Regional Emissions Data System.

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The project has been a cooperative effort. John Langstaff and Vincent DelGobbo provided invaluable assistance in compiling and interpreting the extensive information required for this document. In addition, Joan Novak of EPA's Atmospheric Sciences Research Laboratory provided valuable support and guidance throughout this effort.

EXECUTIVE SUMMARY

The 1980 NAPAP Emissions Inventory has been developed by the National Acid Precipitation Assessment Program's (NAPAP) Task Group on Emissions and Controls. To create modeling inventories in support and testing of the Regional Acid Deposition Model (RADM) and the Regional Oxidant Model (ROM), temporal, spatial, and pollutant species allocation factors were developed. This report summarizes spatial allocation factor development for area source emissions and documents the software and files used to create the factors.

SPATIAL ALLOCATION OVERVIEW

Data used to estimate and apportion area source emissions for the NAPAP grid system (comprised of 1/4° longitude by 1/6° latitude grid cells) are derived from diverse sources. Actual emissions or data from which emissions are calculated (e.g., activity levels such as tons of coal sold or gasoline fuel consumption) are reported at the state or county level. Census data for population and housing are reported at various levels of geographic coverage, including subcounty levels. Land use data from satellite imagery and land use/cover maps were developed for a 1/4° longitude by 1/6° latitude grid. The land use data by grid cell, however, required resolution relative to the county-level. The series of programs in this document assimilate the population, housing and land use data into county-level values and redistribute the information into spatial fractions, where a spatial fraction is defined as the fraction of a county's population, housing or land use contained within a specific grid cell.

Spatial allocation factors were developed to apportion NAPAP area source emissions from counties to individual grid cells as required for modeling applications. The goal of the spatial allocation factor development effort was to create as many spatial surrogates as possible for each county to allow the user maximum flexibility in assigning county-level area source emissions to specific grid cells. The surrogates are used to represent the subcounty distribution of area source emissions for each emissions category. Fourteen surrogate indicators were developed for use with the NAPAP inventory based on housing, population, and land use data. Once the subcounty distribution of each surrogate indicator is determined, area source emissions categories are matched to the most appropriate surrogate indicators. The resultant file, the Spatial Allocation Factor File (SAFF), is input to the Spatial Allocation Module (SAM) of the Flexible Regional Emissions Data System[1] (FREDS) such that area source emissions may be spatially apportioned to the grid cells.

GRID DESCRIPTION

The NAPAP grid system covers the United States and Canada extending from 50° to 125° west longitude, and from 25° to 60° north latitude. Grid cells are 1/6° latitude by 1/4° longitude or approximately 20 x 20 km. For the purposes of this document, only spatial surrogates developed for U.S. area source categories are considered. This is due to differences in the Canadian spatial allocation methodology and limits of the current spatial software.

The grid system defined for U.S. spatial factor development is comprised of 37,440 grid cells (156 rows, 240 columns). The boundaries for the U.S. extend from 65° to 125° west longitude and from 25° to 51° north latitude. The cell at the southwesternmost corner of the grid is defined by (row,column) = (1,1), with column numbers increasing west to east, and rows from south to north.

1.0 INTRODUCTION

BACKGROUND

The National Acid Precipitation Assessment Program (NAPAP) was established by Congress in 1980 to coordinate and expand research on problems posed by acid deposition in and around the United States. The program is managed through the Interagency Task Force on Acid Precipitation which coordinates seven task groups having specific technical responsibilities. The Task Group on Emissions and Controls is charged with development of comprehensive and accurate inventories of emissions from sources thought to be important in acid deposition processes. To fulfill its stated objective and to support other related NAPAP research, the Task Group on Emissions and Controls has generated a number of major emissions data bases using 1980 as the base year.

The primary focus of the 1980 NAPAP Emissions Inventory is the fulfillment of the emissions data requirements for development and testing of the Eulerian Regional Acid Deposition Model (RADM). Within EPA's Office of Research and Development, the Atmospheric Sciences Research Laboratory (ASRL) has been assigned lead responsibility for developing the RADM. The National Center for Atmospheric Research (NCAR) has been assigned the task of developing the model framework which includes a number of chemical transformation modules. In addition, emissions data are also used to support applications of the Regional Oxidant Model (ROM).

To support development and testing of these models, one of the most extensive applications of the NAPAP Emissions Inventory, the 1980 Annual Inventory (Version 5.0) had to be resolved temporally, spatially, and by component species to create an Eulerian modeling emissions inventory (Version 5.2) and an oxidant modeling emissions inventory (Version 5.3). To create the modeling inventories, temporal, spatial, and pollutant species allocation factors were developed and applied to the Version 5.0 data base.

In addition to creating allocation factors to address modeling requirements, a data handling system capable of creating subsequent versions of the NAPAP Emissions Inventory was developed. The Flexible Regional Emissions Data System (FREDS) for the 1980 NAPAP Emissions Inventory consists of five primary independent modules and was used to preprocess the 1980 NAPAP emissions data for input to the RADM.

Processing of area source emissions for modeling applications requires spatial resolution of county-level emissions to grid cells 1/4° longitude by 1/6° latitude (approximately 20 x 20 km). This is accomplished using spatial allocation factors and the Spatial Allocation Module (SAM) of FREDS. The purpose of this report is to document the software used to generate spatial allocation factors for input to SAM.

Spatial allocation factors were developed to apportion area source emissions from counties to individual grid cells as required for modeling applications. The goal of the spatial allocation factor development effort was to create as many surrogate values as possible for each county, allowing the user maximum flexibility in assigning county-level emissions to specific grid cells. These surrogates are used to estimate the subcounty distribution of area source emissions.

Data used to estimate area source emissions for the NAPAP grid system are derived from diverse sources. Actual emissions or data from which emissions may be calculated (e.g., activity levels such as tons of coal sold or gasoline fuel consumption) are reported at the state or county level. Census data for population and housing are reported at various levels of geographic coverage, including subcounty levels. Land use data from satellite imagery and land use/cover maps were developed for a 1/4° longitude by 1/6° latitude grid. The land use by grid cell, however, required resolution relative to the county level. The series of programs in this document assimilate the population, housing and land use data into county-level values and redistribute the information into spatial fractions, where a spatial fraction is defined as the fraction of a county's population, housing or land use contained within a specific grid cell. As an example, the total housing count of County A is 1,000 units. If the housing count of County A within grid cell (1,1) is 200, then the spatial fraction for housing for County A for grid cell (1,1) is 0.20. Therefore, 20 percent of County A's area source emissions allocated by housing, e.g., residential fuel, would be allocated to grid cell (1,1).

Fourteen surrogate indicators were developed for use with the NAPAP inventory based on housing, population, and land use data. The categories and sources of data are summarized in Table 1-1. Once the subcounty distribution of each surrogate indicator is determined, area source emissions categories are matched to the most appropriate surrogate indicators. The resultant file, the Spatial Allocation Factor File (SAFF), is input to the Spatial Allocation Module (SAM) of the Flexible Regional Emissions Data System (FREDS) such that area source emissions may be spatially distributed among 1/6° latitude by 1/4° longitude grid cells.

Grid Description

The NAPAP grid system covers the United States and Canada extending from 50° to 125° west longitude and from 25° to 60° north latitude. Figure 1-1 illustrates the extent of NAPAP grid. It should be noted that this figure depicts 2/3° latitude by 1° longitude grids for visual clarity. For the purposes of this document, only spatial surrogates developed for U.S. area source categories are considered. This is due to differences in the Canadian spatial allocation methodology and limits of the current spatial software. For 1980 processing, Canada supplied NAPAP with approximate 20 x 20 km gridded spatial surrogates for eight categories relative to the province level, which required separate processing of these data.

The grid system defined for U.S. spatial factor development is comprised of 37,440 grid cells (156 rows, 240 columns) each 1/6° latitude by 1/4° longitude (approximately 20 x 20 km). The boundaries extend from 65° to 125° west longitude and from 25° to 51° north latitude. The cell at the southwesternmost corner of the grid is denoted (1,1), with column numbers increasing west to east, and rows from south to north. Column and row numbers are calculated from latitude and longitude as follows:

column - ((WLNG-Longitude) x DLON) + 1

row - ((Latitude - SLAT) x DLAT) + 1,

where:
WLNG - Western boundary of the grid (125° for NAPAP)
DLON - The number of grids/degree longitude (4 for NAPAP)
SLAT - Southern boundary of the grid (25° for NAPAP)
DLAT - The number of grids/degree latitude (6 for NAPAP).

TABLE 1-1. SPATIAL ALLOCATION SURROGATES AVAILABLE IN THE NAPAP SPATIAL ALLOCATION FACTOR FILE

Surrogate Indicator Number	Surrogate Indicator	Source
1	Population	1980 Census
2	Housing	1980 Census
3	Urban Land	Landsat
4	Agricultural Land	Landsat
5	Rangeland	Landsat
6	Deciduous Forest	Landsat
7	Coniferous Forest	Landsat
8	Mixed Forest and Forested Wetland	Landsat
9	Water	Landsat
10	Outside Study Area	Landsat
11	Non-Forested Wetland	Landsat
12	Mixed Agricultural Land and Rangeland	Landsat
13	Composite Forest	Landsat
14	Land Area	EPA/Alliance

The Landsat data are for 1972-1973

Source: EPA-600/7-85-035
National Acid Precipitation Assessment Program
Emission Inventory Allocation Factors[2]

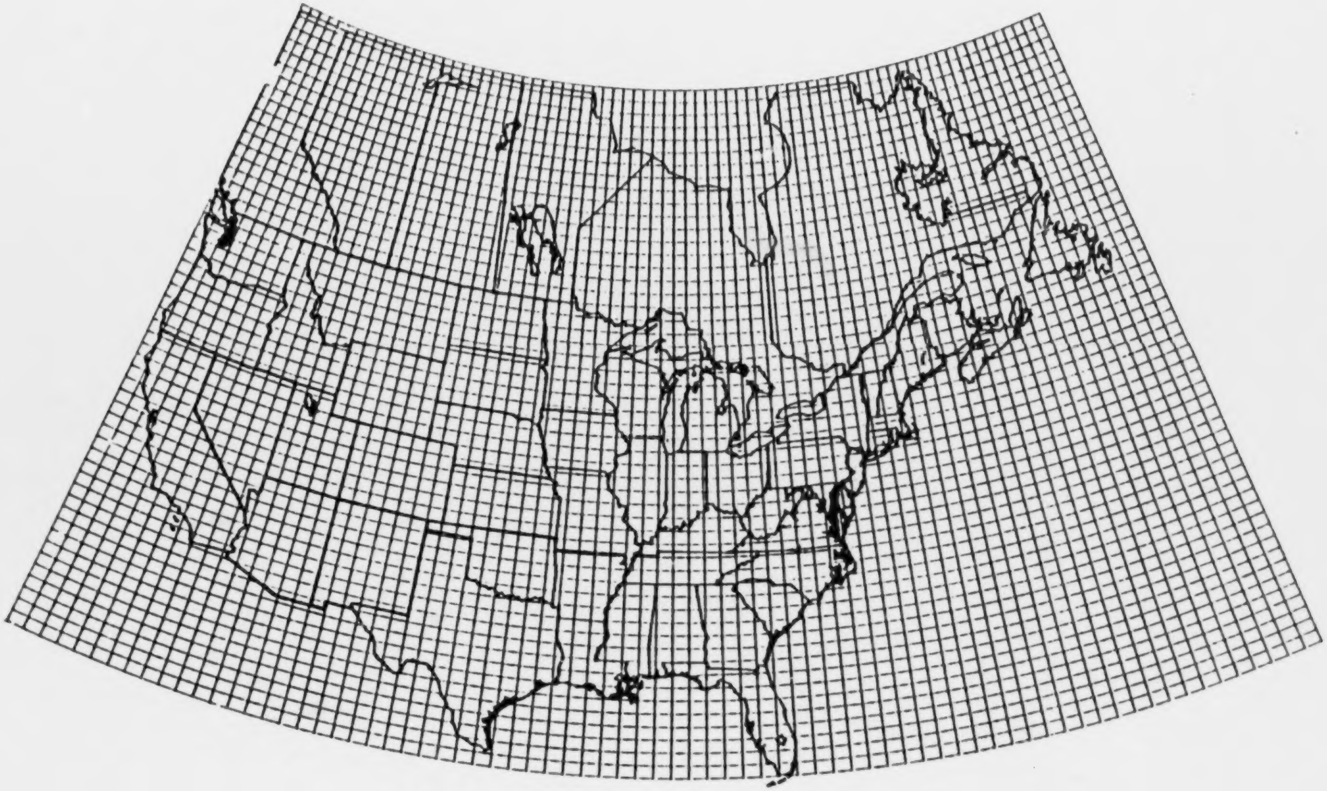

Figure 1-1. The extent of NAPAP grid. Note: 2/3° latitude by 1° longitude (approximate 80 x 80 km) grid cells are plotted in this figure.

Source: Flexible Regional Emissions Data System (FREDS) Documentation for the 1980 NAPAP Emissions Inventory.[1]

The resultant integer parts are the column and row numbers; fractional parts are truncated.

FREDS OVERVIEW

The Flexible Regional Emissions Data System (FREDS) is a software system designed to produce an emissions inventory suitable for input to regional acid deposition and oxidant models. FREDS extracts emissions data, pertinent modeling parameters (e.g., stack height, exhaust gas temperature, etc.) and source identification information from EIS Master File records or preprocessed data files and applies appropriate temporal spatial, and pollutant species allocation factors to derive a gridded, speciated, and temporally resolved emissions file. FREDS for the 1980 NAPAP Emissions Inventory consists of five primary modules which are used to apply allocation factors to the annual emissions data, plus peripheral software used to quality assure and maintain the allocation factor files. (Separate programs are used to process point and area sources for 4 of the 5 primary modules.) The five primary modules are the Model Data Extraction Module (MDEM), the Temporal Allocation Module (TAM), the Speciation Module (SM), the Spatial Allocation Module (SAM), and the Model Input Preprocessor (MIP). An overview of the 1980 FREDS system is presented in Figure 1-2. To maximize flexibility, FREDS allows user definition of up to 15 pollutant emissions and their identities (referenced by SAROAD code), the temporal scenario, spatial grid origin, and the number and relationship of pollutant subspecies. FREDS modules are written in the language of SAS* and reside on the National Computer Center's (NCC) IBM 3090. Complete documentation of FREDS is given in "The Flexible Regional Emissions Data System for the 1980 NAPAP Emissions Inventory".[1]

Spatial Allocation Module Overview--

The Spatial Allocation Module (SAM) spatially resolves county-level area source emissions to grid cells using spatial allocation factors and a user

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*SAS is a registered trademark of the SAS Institute, Cary, North Carolina.

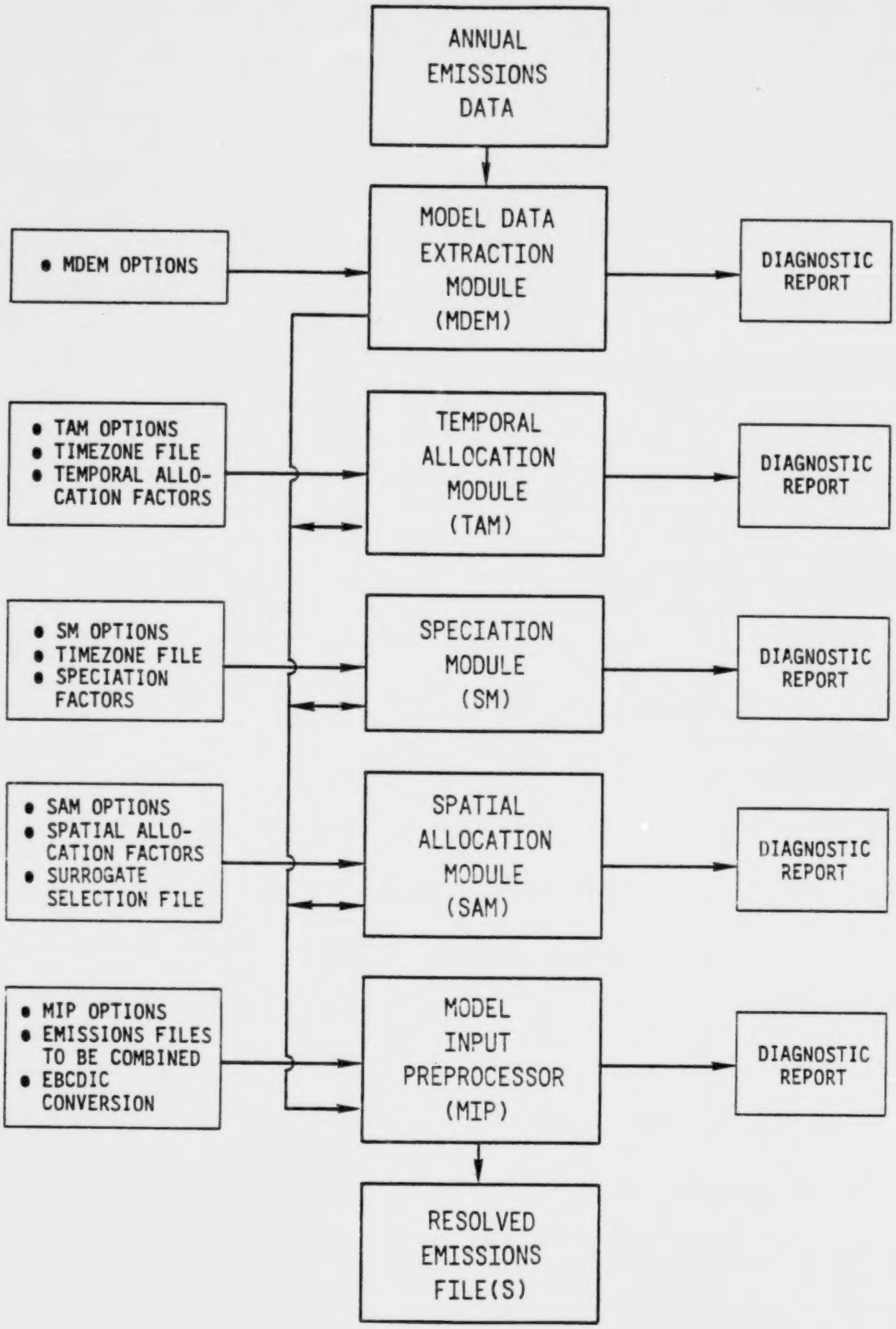
ANNUAL EMISSIONS DATA
MODEL DATA EXTRACTION MODULE (MDEM)
• MDEM OPTIONS
DIAGNOSTIC REPORT
• TAM OPTIONS
• TIMEZONE FILE
• TEMPORAL ALLOCATION FACTORS
TEMPORAL ALLOCATION MODULE (TAM)
DIAGNOSTIC REPORT
• SM OPTIONS
• TIMEZONE FILE
• SPECIATION FACTORS
SPECIATION MODULE (SM)
DIAGNOSTIC REPORT
• SAM OPTIONS
• SPATIAL ALLOCATION FACTORS
• SURROGATE SELECTION FILE
SPATIAL ALLOCATION MODULE (SAM)
DIAGNOSTIC REPORT
• MIP OPTIONS
• EMISSIONS FILES TO BE COMBINED
• EBCDIC CONVERSION
MODEL INPUT PREPROCESSOR (MIP)
DIAGNOSTIC REPORT
RESOLVED EMISSIONS FILE(S)

Figure 1-2. Schematic of the 1980 Flexible Regional Emissions Data System.

Source: Flexible Regional Emissions Data System (FREDS)Documentation for the 1980 NAPAP Emissions Inventory.[1]

defined grid. The grid boundaries and cell size are input as control options to SAM. The limiting factor is the existence of a set of spatial allocation factors which is compatible with the user-defined grid. SAM accepts an EBCDIC spatial factor file (the Spatial Allocation Factor File) output by the Spatial Allocation Factor Preprocessor (SAFP), the final program executed for the generation of spatial factors. This file contains SCC, state, county, column, row, and a spatial surrogate value assigned to each record. Spatial allocation is accomplished by matching area source emissions records to those in the Spatial Allocation Factor File (SAFF) and multiplying county-level area source emissions by their corresponding spatial fractions.

SPATIAL FACTOR OVERVIEW

The development of spatial allocation factors is based on two main sources of data: U.S. Department of Commerce, Bureau of the Census, Census of Population and Housing, 1980, and land use/classification data derived from 1972-1973 Landsat satellite imagery and land use/cover maps. Separate software was created to process the Census and Landsat data. Once spatial fractions are generated from the data, the Census and Landsat allocation files are merged to form a data set containing state, county, column, row, and 14 spatial surrogates on each record. Data processing prior to and up to this step utilizes the National Computer Center's (NCC) Sperry UNIVAC, where output data files are ASCII coded characters. Once the merge is completed, the data are transferred to the NCC's IBM 3090 and converted to EBCDIC characters.

Spatial allocation factor development is completed using the IBM 3090. Spatial fractions for land use and census surrogates are next matched to area source categories in the Spatial Allocation Factor Preprocessor (SAFP) based on a surrogate selection file. For 1980 NAPAP application, 6 of the 14 surrogates are used for spatial allocation. SAFP outputs an EBCDIC file which is compatible with the Spatial Allocation Module (SAM) of FREDS. Table 1-2 contains a listing of the spatial surrogates and their assignment to each area source category.

TABLE 1-2. SPATIAL ALLOCATION FACTOR SURROGATES FOR NAPAP AREA SOURCE EMISSIONS CATEGORIES

Cat. ID	Surrogate ID	Surrogate Indicator	Emissions Category
1	2	Housing	Residential Fuel--Anthracite Coal
2	2	Housing	Residential Fuel--Bituminous Coal
3	2	Housing	Residential Fuel--Distillate Oil
4	2	Housing	Residential Fuel--Residual Oil
5	2	Housing	Residential Fuel--Natural Gas
6	2	Housing	Residential Fuel--Wood
7	3	Urban Land	Commercial/Institutional Fuel--Anthracite Coal
8	3	Urban Land	Commercial/Institutional Fuel--Bituminous Coal
9	3	Urban Land	Commercial/Institutional Fuel--Distillate Oil
10	3	Urban Land	Commercial/Institutional Fuel--Residual Oil
11	3	Urban Land	Commercial/Institutional Fuel--Natural Gas
12	3	Urban Land	Commercial/Institutional Fuel--Wood
13	3	Urban Land	Industrial Fuel--Anthracite Coal
14	3	Urban Land	Industrial Fuel--Bituminous Coal
15	3	Urban Land	Industrial Fuel--Coke
16	3	Urban Land	Industrial Fuel--Distillate Oil
17	3	Urban Land	Industrial Fuel--Residual Oil
18	3	Urban Land	Industrial Fuel--Natural Gas
19	3	Urban Land	Industrial Fuel--Wood
20	3	Urban Land	Industrial Fuel--Industrial Process Gas
21	2	Housing	Incineration--Residential
22	3	Urban Land	Incineration--Industrial
23	3	Urban Land	Incineration--Commercial/Institutional
24	2	Housing	Open Burning--Residential
25	3	Urban Land	Open Burning--Industrial
26	3	Urban Land	Open Burning--Commercial/Institutional
27	14	Land Area	Light Duty Gas Vehicles--Limited Access
28	14	Land Area	Light Duty Gas Vehicles--Rural
29	2	Housing	Light Duty Gas Vehicles--Suburban
30	3	Urban Land	Light Duty Gas Vehicles--Urban
31	14	Land Area	Medium Duty Gas Vehicles--Limited Access
32	14	Land Area	Medium Duty Gas Vehicles--Rural
33	2	Housing	Medium Duty Gas Vehicles--Suburban
34	3	Urban Land	Medium Duty Gas Vehicles--Urban
35	14	Land Area	Heavy Duty Gas Vehicles--Limited Access
36	14	Land Area	Heavy Duty Gas Vehicles--Rural
37	2	Housing	Heavy Duty Gas Vehicles--Suburban
38	3	Urban Land	Heavy Duty Gas Vehicles--Urban
39	14	Land Area	Off-Highway Gas Vehicles
40	14	Land Area	Heavy Duty Diesel Vehicles--Limited Access

(continued)

TABLE 1-2 (continued)

Cat. ID	Surrogate ID	Surrogate Indicator	Emissions Category
41	14	Land Area	Heavy Duty Diesel Vehicles--Rural
42	2	Housing	Heavy Duty Diesel Vehicles--Suburban
43	3	Urban Land	Heavy Duty Diesel Vehicles--Urban
44	14	Land Area	Off-Highway Diesel Vehicles
45	3	Urban Land	Railroad Locomotives
46	1	Population	Aircraft--Military
47	1	Population	Aircraft--Civil
48	1	Population	Aircraft--Commercial
49	1	Population	Vessels--Coal-Powered
50	1	Population	Vessels--Diesel
51	1	Population	Vessels--Residual Oil
52	1	Population	Vessels--Gasoline
54	1	Population	Gasoline Marketed
55	14	Land Area	Unpaved Roads
60	13	Composite Forest	Forest Fires
61	13	Composite Forest	Managed Burning
62	4	Agricultural Land	Agricultural Field Burning
64	2	Housing	Structural Fires
71	4	Agricultural Land	Manure Field Application--Beef Cattle
72	4	Agricultural Land	Manure Field Application--Dairy Cows
73	4	Agricultural Land	Manure Field Application--Hogs and Pigs
74	4	Agricultural Land	Manure Field Application--Broilers
75	4	Agricultural Land	Manure Field Application--Other Chickens
76	4	Agricultural Land	Anhydrous NH3 Fertilizer Application
77	4	Agricultural Land	Beef Cattle Feed Lots
78	1	Population	Degreasing
79	1	Population	Drycleaning
80	1	Population	Graphic Arts
81	1	Population	Rubber and Plastic Manufacturing
82	1	Population	Architectural Coating
83	1	Population	Auto Body Repair
84	1	Population	Motor Vehicle Manufacturing
85	1	Population	Paper Coating
86	1	Population	Fabricated Metals
87	1	Population	Machinery Manufacturing
88	1	Population	Furniture Manufacturing
89	1	Population	Flat Wood Products
90	1	Population	Other Transportation Equipment Manufacturing
91	1	Population	Electrical Equipment Manufacturing

(continued)

TABLE 1-2 (continued)

Cat. ID	Surrogate ID	Surrogate Indicator	Emissions Category
92	1	Population	Ship Building and Repair
93	1	Population	Miscellaneous Industrial Manufacturing
94	1	Population	Miscellaneous Industrial Solvent Use
95	1	Population	Miscellaneous Non-Industrial Solvent Use
96	1	Population	Utility Area Sources--Coal Fired Plants
97	1	Population	Utility Area Sources--Oil Fired Plants
98	1	Population	Utility Area Sources--Natural Gas Fired Plants
99	3	Urban Land	Minor Area Sources

Source: Development of the 1980 NAPAP Emissions Inventory[3]

Population and Housing Factors

The starting point of the census based spatial allocation surrogates is the U.S. Department of Commerce, Bureau of the Census, Census of Population and Housing, 1980. This file consists principally of sample data expanded to represent the total population. However, data pertinent to persons and housing units is based upon 100-percent counts and unweighted sample counts.[4] Examples of data included in the housing and population census are presented in Table 1-3.

Census data are summarized at the state (or state equivalent) level, and are broken down, in hierarchical sequence, to the following levels: counties or county equivalents, minor civil divisions (MCDs) or census county divisions (CCDs), places or place segments within MCDs/CCDs and remainders of MCDs/CCDs, census tracts or block numbering areas (BNAs), and block groups (BGs) or, for areas that are not block-numbered, enumeration districts (EDs). In addition, place and congressional districts (districts delineated for the 96th Congress) are presented separately from the hierarchical summary organization. Each geographic level is identified by an assigned numeric value as indicated in Table 1-4.

The longitude, latitude, and land area data fields in the census population and housing tapes (one for each state) are modified by EPA, since these fields on the census produced Summary Tape File (STF3A) tapes are blank. EPA inserts values for these fields using the Master Area Reference File (MARF)2.[5] From this point, reference to the census tapes refers to the modified EPA tapes.

Housing and population based spatial allocation factors are based on the state-specific data files described above. This process involves executing three separate Fortran programs: CREATE7A, CREATE5A, and VIRGINIA. Program descriptions for each program are presented in Section 3.

TABLE 1-3. EXAMPLE DATA ITEMS INCLUDED IN THE BUREAU OF THE CENSUS, CENSUS OF POPULATION AND HOUSING, 1980

Population	Housing
Household relationship[a]	Number of units at address[a]
Sex[a]	Complete plumbing facilities[a]
Race[a]	Number of rooms[a]
Age[a]	Tenure (whether owned or rented)[a]
Marital status[a]	Vacancy status[a]
Spanish origin[a]	Value for noncondominiums[a]
School enrollment	Rent
Years of school completed	Units in structure
Nativity and place of birth	Stories in structure and presence of passenger elevator
Language spoken at home and ability to speak English	Year structure built
Ancestry	Year householder moved into unit
Residence in 1975	Source of water
Labor force status in 1979	Farm residence
Veteran status and period of service	Sewage disposal
Work disability status	Heating equipment
Transportation disability status	House heating fuel
	Water heating fuel
	Cooking fuel

[a] 100-percent item from sample questionnaire.

Source: Census of Population and Housing, 1980: Summary Tape File 3 Technical Documentation.[4]

TABLE 1-4. HOUSING AND POPULATION CENSUS IDENTIFIERS FOR GEOGRAPHIC LEVELS

Geographic Level[a]	Numeric Identifier
United States	01
Region	02
Division	03
State	04
SCSA	05
SCSA/State	06
SMSA	07
SMSA/State	08
Urbanized Area	09
Urbanized Area/State	10
State/County	11
State/County/MCD (CCD)	12
State/County/MCD (CCD)/Place	13
State/County/MCD (CCD)/Place/Tract (BNA)	14
State/County/MCD (CCD)/Place/Tract (BNA)/BG	15
State/County/MCD (CCD)/Place/Tract (BNA)/ED	16
State/SMSA/County	17
State/SMSA/County/MCD (CCD)	18
State/SMSA/County/MCD (CCD)/Place	19
State/SMSA/County/MCD (CCD)/Place/Tract (BNA)	20
State/SMSA/County/MCD (CCD)/Place/Tract (BNA)/Block	21
State/SMSA/County/MCD (CCD)/Place/Tract (BNA)/ED	22
State/SMSA/County/Place	23
State/SMSA/County/Place/Tract (BNA)	24
State/SMSA/County/Place/Tract (BNA)/Block	25
State/SMSA/County/Place/Tract (BNA)/ED	26
State/Place	27
State/MCD Sequence Number	28
Indian Reservation (ANV)	29
Indian Reservation (ANV)/State	30
Indian Reservation (ANV)/State/County	31
State/SMSA/County/Tract (BNA)	32
State/Congressional District	33
5-Digit Zip Within State	35
5-Digit Zip State/SMSA/County	36
State/Congressional District/County	37
State/Congressional District/County/Place	38
State/Congressional District/County/MCD	39

[a] SCSA - standard consolidated statistical area
SMSA - standard metropolitan statistical area
MCD - minor civil division
CCD - census county division
BNA - block numbering area
BG - block group
ED - enumeration district
ANV - Alaska native village

Source: Census of Population and Housing, 1980: Summary Tape File 3 Technical Documentation.[4]

Land Use Spatial Factors

Development of the land use derived spatial allocation factors uses two data files: land use/cover percentages for 1/6° latitude by 1/4° longitude grid cells and county-grid area relationships. The land use/cover data base was developed by Lockheed Engineering and Management Services Company's Remote Sensing Laboratory under contract for the Meteorology and Assessment Division of EPA's Environmental Sciences Research Laboratory (ESRL), currently Atmospheric Sciences Research Laboratory (ASRL). The data base was developed using Landsat mosaic images covering the periods 23 July-31 October 1972, and 1 January-31 March 1973, and Land Use and Land Cover Maps developed in the middle to late nineteen seventies. The development of the land use percentages has been summarized by Lockheed.[6]

The total land use/cover in each grid cell is divided into the following classifications:

- Urban Land
- Agricultural Land
- Rangeland
- Deciduous Forest Land
- Coniferous Forest Land
- Mixed Agricultural Land and Rangeland
- Mixed Forest Land (includes forested wetlands)
- Water
- Land Outside the Study Area
- Nonforested Wetland

Each land classification percentage reported by Lockheed represents that portion of the grid cell comprised of that land use category. In addition to the ten land use/cover categories supplied by Lockheed, two additional categories were calculated for NAPAP:

- Composite Forest
- Land Area.

Composite Forest is comprised of coniferous, deciduous, and mixed forest for each grid cell (this calculation is performed prior to the allocation of grid cells to counties). Land area is the fraction of a county's total land area contained within a grid cell and is calculated from data in the county-grid file.

To process the gridded land use percentages relative to county-level emissions, a data file containing county-grid relationships was created. To accomplish this, a file containing county boundaries (the County Dime File) is used in conjunction with the NAPAP grid system and software developed by ESRL. County-grid relationships are calculated as the fraction of each county in each grid cell. An example of this process is illustrated in Figure 1-3.

Applying the county-grid file to the land use/cover percentages allows gridded land use fractions to be expressed as the fraction of a county's land use/cover in a grid cell. The fractional totals for each county sum to 1; fractional totals by grid cell do not sum to a particular number. The methodology by which this is accomplished is discussed with the program NEWLAND.

OBJECTIVES

The objectives of this report are to document, in a concise manner, the software used to generate spatial allocation factors applicable to the 1980 NAPAP emissions inventory. The document contains source code, control statements, and I/O formats, allowing the user to duplicate the process if desired. Physical descriptions of the allocation factor development process are discussed only briefly in the following sections: Introduction, System Charts, and Program Descriptions. Descriptive documentation of the allocation factor development process has been detailed in previous reports.[2,3,7]

REPORT ORGANIZATION

The main sections of the report are organized as follows:

- Introduction

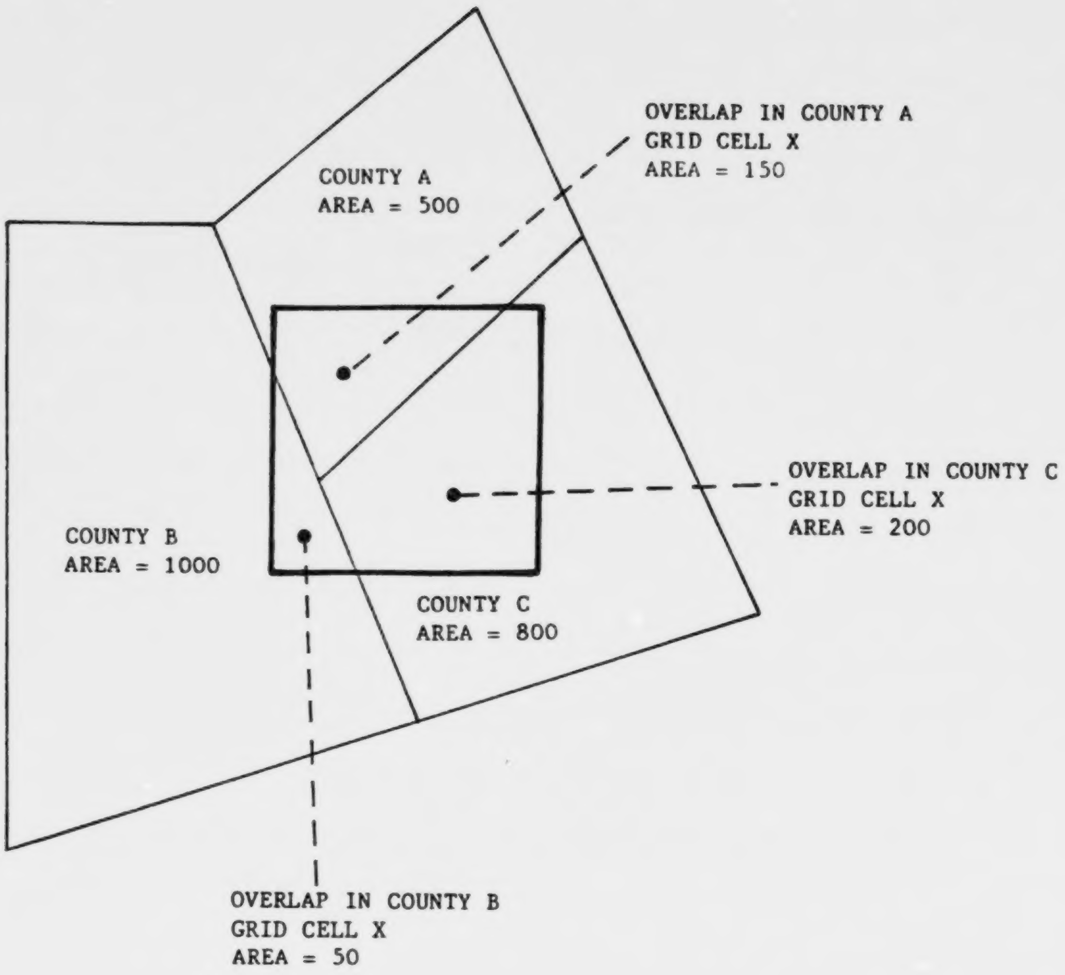
OVERLAP IN COUNTY A
GRID CELL X
AREA = 150
COUNTY A
AREA = 500
OVERLAP IN COUNTY C
GRID CELL X
AREA = 200
COUNTY B
AREA = 1000
COUNTY C
AREA = 800
OVERLAP IN COUNTY B
GRID CELL X
AREA = 50

Figure 1-3. Example of county to grid cell areal relationship.

Source: National Acid Precipitation Assessment Program Emission Inventory Allocation Factors.[2]

- System Charts
- Program Descriptions
- Input/Output Description
- Control Statements

This format should allow the user to gain an understanding of spatial factor processing procedures for the 1980 NAPAP Inventory by reading the document sections sequentially.

2.0 SYSTEM CHARTS

The system charts for spatial factor processing are presented as follows: population and housing (Figure 2-1), Landsat land use/cover data (Figure 2-2), and merge and final processing of spatial allocation factors (Figure 2-3).

Population and housing data are processed through a series of three sequential programs. These programs, written in Fortran, are executed on the NCC Sperry UNIVAC. CREATE7A reads EPA's STF3A tape for each State requested and outputs a condensed census file. CREATE5A inputs the condensed census file and a user defined grid to generate subcounty gridded census data (e.g., population). For the State of Virginia, gridded census fractions are modified by the program VIRGINIA to avoid double counting or omission of the State's independent cities. This is the final step of the population and housing spatial factor processing.

The land use spatial factor processing is accomplished by a Fortran program executed on the Sperry UNIVAC: NEWLAND. Prior to NEWLAND, software developed by ESRL uses the NAPAP grid and county boundary definitions from the County Dime File to generate the county-grid relationships. These fractions are used by NEWLAND to reprocess the land use spatial fractions, supplied as the percent land use of each grid cell, to the fractional county land use for each grid cell. The resultant output file contains land use spatial fractions for 12 surrogates by state, county, column, and row.

Final processing of the spatial allocation factors is performed by the programs SPACEMERGE and SAFP (Spatial Allocation Factor Preprocessor). SPACEMERGE, a Fortran program housed on the UNIVAC, reads in spatial fractions generated by both the census and land use processing and merges these factors by state, county, column, and row. The resultant file contains one record for each state, county, column, row, and 14 spatial

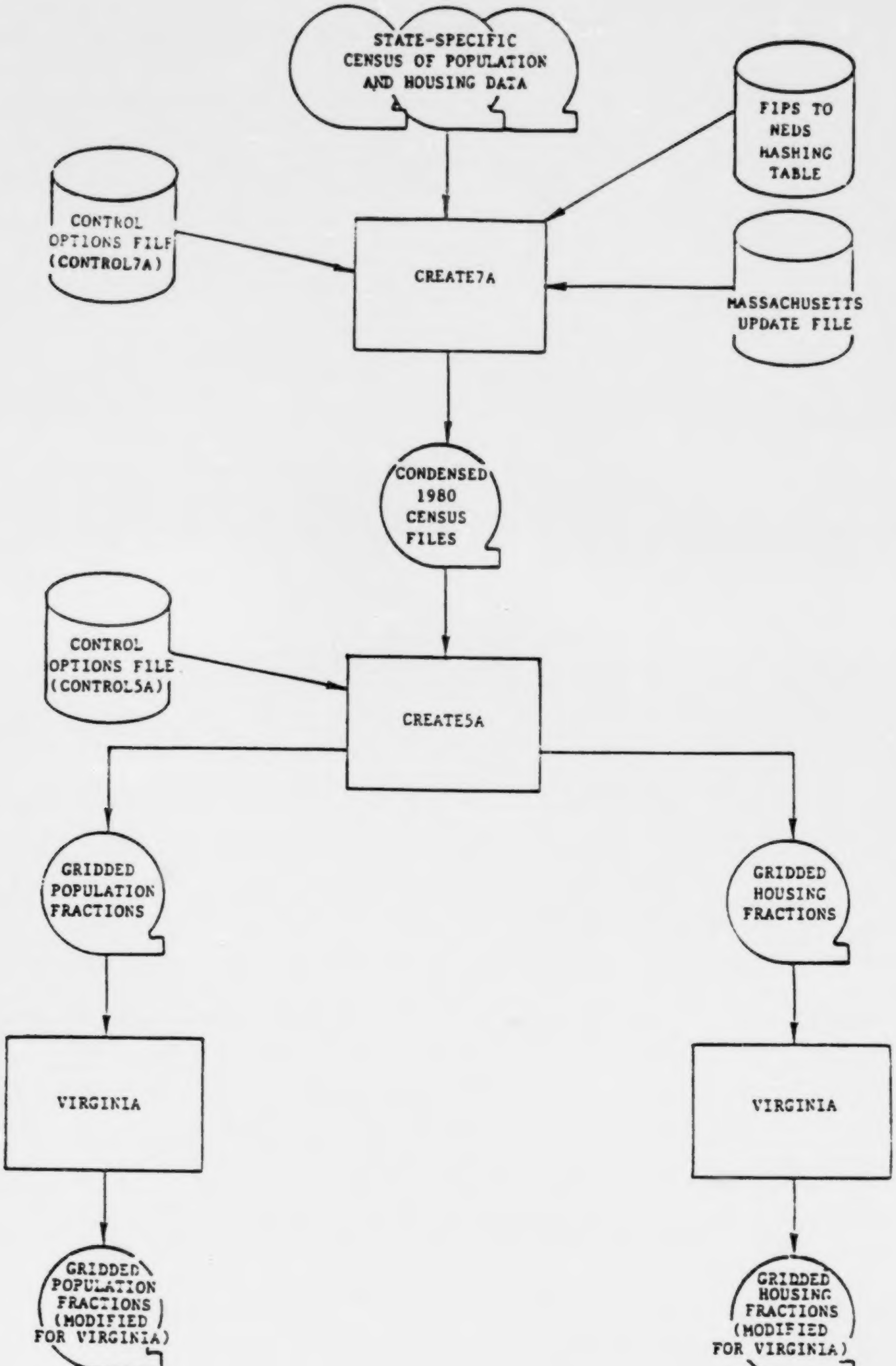
STATE-SPECIFIC CENSUS OF POPULATION AND HOUSING DATA
FIPS TO NEDS HASHING TABLE
CONTROL OPTIONS FILE (CONTROL7A)
CREATE7A
MASSACHUSETTS UPDATE FILE
CONDENSED 1980 CENSUS FILES
CONTROL OPTIONS FILE (CONTROL5A)
CREATE5A
GRIDDED POPULATION FRACTIONS
GRIDDED HOUSING FRACTIONS
VIRGINIA
VIRGINIA
GRIDDED POPULATION FRACTIONS (MODIFIED FOR VIRGINIA)
GRIDDED HOUSING FRACTIONS (MODIFIED FOR VIRGINIA)

Figure 2-1. Population and housing spatial factor processing.

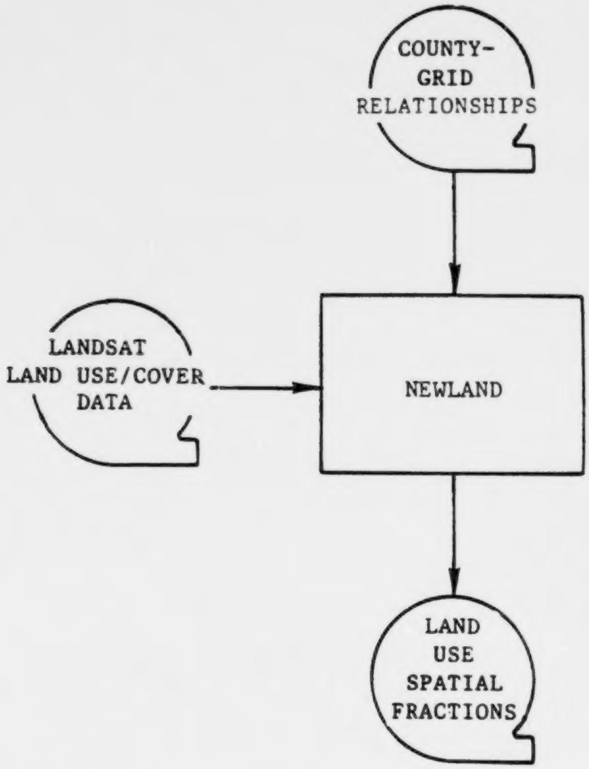
COUNTY-
GRID
RELATIONSHIPS
LANDSAT
LAND USE/COVER
DATA
NEWLAND
LAND
USE
SPATIAL
FRACTIONS

Figure 2-2. Land use spatial factor processing.

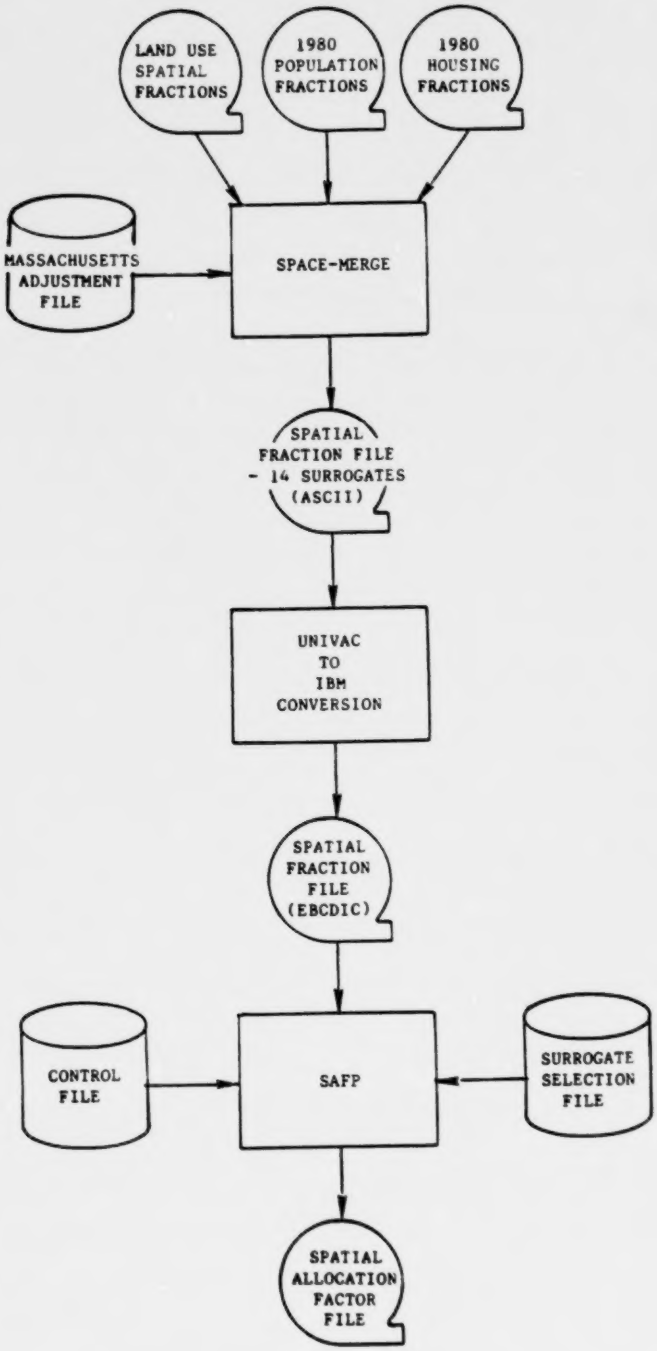
LAND USE SPATIAL FRACTIONS
1980 POPULATION FRACTIONS
1980 HOUSING FRACTIONS
MASSACHUSETTS ADJUSTMENT FILE
SPACE-MERGE
SPATIAL FRACTION FILE - 14 SURROGATES (ASCII)
UNIVAC TO IBM CONVERSION
SPATIAL FRACTION FILE (EBCDIC)
CONTROL FILE
SAFP
SURROGATE SELECTION FILE
SPATIAL ALLOCATION FACTOR FILE

Figure 2-3. Merge of spatial fractions and final spatial allocation factor processing.

surrogates. In the next step, the ASCII file is transferred to the NCC IBM and converted to EBCDIC characters. The EBCDIC file is used by SAFP, a Fortran program executed on the IBM. SAFP matches spatial fractions with area source SCC's by using a surrogate selection file containing SCC number and spatial surrogate number assigned to each SCC. The resultant output is the Spatial Allocation Factor File used by the Spatial Allocation Module of FREDS.

3.0 PROGRAM DESCRIPTIONS

CREATE7A NARRATIVE

The CREATE7A program condenses and reformats the STF3A census files, substitutes NEDS for FIPs codes, and calculates subcounty fractions of housing and population totals, where county totals are present in the denominator and lower-level (i.e, subcounty) values are in the numerator. The program input includes the state-specific census of population and housing data, control options file (COF), FIPS to NEDS conversion file, and the Massachusetts Update File. The COF instructs CREATE7A on input, processing, and output options for program execution. The FIPS to NEDS file is used to convert State/County FIPS codes to NEDS for compatability with the emissions data. For Massachusetts, data are processed relative to Air Pollution Control Districts (APCDs) in place of County-level fractions, requiring an additional file: the Massachusetts Update File. This file instructs the program to assign subcounty units to corresponding APCDs and to calculate the appropriate fractions.

Output files generated by CREATE7A include the condensed census files and two message files: the Suppression Statistics File and the Program Message and Summary Printout. The Suppression Statistics File provides diagnostic information on suppressed counts at various census levels. This may be used to determine whether a particular emission total unit (county or APCD) has an excessive fraction of suppressed counts at the census levels (13-16) normally used as surrogates for emission allocation. Suppression flags are variables in the census file which indicate to the user that a value was withheld. Values may be withheld for two reasons: (1) the flag is a complementary suppression where the information may be manipulated to obtain confidential or sensitive information or (2) there were less than a predefined acceptable number of counts for the geographic area being summarized. The Program Message and Summary Printout File contain the remainder and the majority of diagnostic information.

To calculate subcounty fractions, CREATE7A "attempts to select the highest census level available in a nesting series that may begin with 12, 13, 14, or 15/16, and extend to 15/16. Each selected record will be exclusive of all others. As suggested above, the lowest possible level in any nesting series will be 15 or 16. These two levels, though existing within a single entity, are mutually exclusive. For example, the record sequence for levels 13/15/15/16 means that within the level 13 entity there are three mutually-exclusive subsets. Two are level 15 and one is level 16. The sum of the populations of these three subsets is equal to the population of entity 13. The level 16 record is not contained within the level 15 record preceding it." In other words, numeric identifiers 12 through 16, indicative of the subcounty nesting series of geographic levels, are used to calculate subcounty fractions. Level 12 (minor civil division or census county division) is the highest possible subcounty level and levels 15 and 16 (block group and enumeration district, respectively) are the lowest possible levels. (Refer to Table 1-4 for the geographic levels assigned to these numeric identifiers.) The program listing for CREATE7A is given in Appendix A.

CREATE5A NARRATIVE

CREATE5A generates county-to-grid allocation files for each State output from CREATE7A. Allocation files may be created for up to 11 surrogate categories: total population, rural population, urban population, total housing, rural housing, urban housing, housing heated with natural gas, housing heated with oil or kerosene, housing heated with coal or coke, housing heated by wood, and housing heated by other means (e.g., electricity). For NAPAP purposes, allocation files were generated for total housing and total population surrogates only.

In addition to the condensed census population and housing file, a user defined control options file (COF) is input to CREATE5A. Within the control file, the user specifies the parameters necessary to generate the desired grid, or the geographic area to be gridded (e.g., continental U.S.) and its dimensions as determined by limit values. The limit values input for NAPAP processing are presented in Table 3-1.

TABLE 3-1. USER SPECIFIED LIMIT VALUES FOR THE NAPAP PROCESSING OF CREATE5A

Dimensions	Limit Values
Longitude of southwest corner of grid	125
Latitude of southwest corner of grid	25
Latitude of northeast corner of grid	51
Longitude of northeast corner of grid	65
Longitudinal increment (degrees)	0.25000
Latitudinal increment (degrees)	0.16667

Using the information in Table 3-1, in conjunction with the longitude and latitude of the subcounty centroids (from the census file), CREATE5A generates column and row numbers defining the grid along with population and housing fractions within each grid cell. Separate executions of CREATE5A are required for each surrogate desired, e.g., CREATE5A was executed twice for the 1980 NAPAP spatial factors; once for total population and once for total housing. Column and row numbers are calculated by the two equations presented below:

$$\mathrm{KCOL} = \mathrm{INT}\ ((\mathrm{WLNG}-\mathrm{ALNG})/\mathrm{DLON}) + 1 \qquad (1)$$

where: KCOL = column of a generated grid cell

WLNG = longitude of southwest corner of the grid (user specified in COF)

ALNG = census subcounty centroid longitude (census file)

DLON = longitudinal increment (user specified in the COF)

$$\mathrm{KROW} = \mathrm{INT}\ ((\mathrm{ALAT}-\mathrm{SLAT})/\mathrm{DLAT}) + 1 \qquad (2)$$

where: KROW = row of a generated grid cell

ALAT = census subcounty centroid latitude (census file)

SLAT = latitude of southwest corner of the grid (user specified in COF)

DLAT = latitudinal increment (user specified in the COF)

A listing of the CREATE5A source code can be found in Appendix B. The file format and variable descriptions for the census allocation (output) files are given in Section 4.

VIRGINIA NARRATIVE

VIRGINIA is executed for the State of Virginia to adjust the Census data for the State's independent cities. Thirty-one of the 41 independent cities are considered by CREATE5A to be separate from their respective counties, although both possess the same NEDS ID.

VIRGINIA merges the data by NEDS code, combining identical rows and columns and adjusting corresponding totals. The general program flow is as follows:

1. Read Virginia county record.
2. Check Virginia cities for a NEDS match.
3. If there is no match, retrieve another county. Else (if match) combine the data, replace at county position and set city NEDS ID to 000.
4. Eliminate city data with NEDS ID = 000 and append the remaining 10 cities back to the file.

The 10 cities appended back to the file are processed differently from the other 31 because they are treated as county equivalents in the county-level annual area source emissions file. This is significant factor, as the allocation file is later merged with the emissions file via the Spatial Allocation Module. The 10 independent Virginia cities considered county equivalents for emissions processing are:

Alexandria
Chesapeake
Fairfax
Hampton
Newport News
Norfolk
Portsmouth
Richmond
Suffolk (Nansemond)
Virginia Beach

The allocation files (population and housing for NAPAP) are output individually by CREATE5A and, therefore, are processed separately through VIRGINIA. The program code requires modification to reflect the allocation file being processed and the program recompiled. Refer to Appendix C for VIRGINIA's program listing.

NEWLAND NARRATIVE

NEWLAND is a Fortran program which reads and processes the land use and land cover data prepared by Lockheed Engineering and Management Services Company. The main function of the program is to convert the land use data, reported as the percent of each grid occupied by each land use category, into the fraction of each county's land use assigned to each grid cell.

Two input files are used to process these data: land use percentages and county-to-grid fractions. Formats and variable descriptions for these files are given in Section 4, Input/Output Description. Two output files are generated by NEWLAND: land use/land cover data expressed as the fraction of each county's land use in each grid cell, and a report file summarizing NEWLAND's processing action.

The gridded land use percentages input to NEWLAND were developed under EPA contract by Lockheed Engineering and Management Services Company's Remote Sensing Laboratory using Landsat mosaic images, U.S. Geologic Survey Land Use and Land Cover map series, and single-scene Landsat spot coverage. A complete description of the land use data development has been given by Lockheed.[6] The land use/cover consists of ten classifications, where each reported percentage represents the fraction of each grid cell comprised of each land use category. The categories are as follows:[2]

- Urban land
- Agricultural land
- Rangeland
- Deciduous forest land
- Coniferous forest land
- Mixed forest and forested wetlands
- Water
- Barren land
- Nonforested wetland
- Mixed agricultural land and rangeland

Furthermore, two additional categories are calculated in NEWLAND: composite forest land and land area. Composite forest is calculated from the sum of coniferous, deciduous, and mixed forest land percents in each grid cell; i.e.:

$$\text{Percent}_{(\text{composite})} = \text{Percent}_{(\text{coniferous})} + \text{Percent}_{(\text{deciduous})} + \text{Percent}_{(\text{mixed})} .$$

Land area is calculated as the fraction of a county's land area contained within each grid cell from data contained in the county-grid file.

Application of the land use/cover data for spatial allocation of county-level area source emissions required reclassification of land use percents for each grid cell into the fraction of each county's land use within each grid cell. To accomplish this, grid/county area relationships were determined using software developed by ESRL and a county boundary data file. The resultant county-to-grid file contains for each county, the fractional areas for each grid cell in the county.

Spatial allocation factors for each land use classification are calculated as follows:[2,3]

$$SAF_{cxi} = \frac{(A_{ci})\ (A_{xi})}{\sum_{i=1}^{n} (A_{ci})\ (A_{xi})}$$

where: SAF_{cxi} = The spatial allocation factor for county c, land use type x, and grid i.

A_{ci} = The portion of county c that falls within grid i.

A_{xi} = The portion of grid i with land use type x.

n = The number of grids covering county c.

Examples of the application of this formula have been described in other documents.[2,3] A source code listing OF NEWLAND is given in Appendix D. Output files include the land use spatial fractions and a printed report file.

SPACEMERGE NARRATIVE

SPACEMERGE is a Fortran program which reads spatial fractions generated from the land use and census data and match merges each record by NEDS ID (state/county code), column number, and row number. For land use records, grid numbers are reported and, therefore, column and row numbers are calculated as follows:

ROW = INT (IGRDNO/NCOL) + 1

COL = MOD(IGRDNO,NCOL)

where: IGRDNO = grid number,

NCOL = number of columns in the user defined grid (240 for NAPAP),

INT returns the truncated integer when IGRDNO is divided by NCOL, and

$$\mathrm{MOD(IGRDNO,NCOL)} = \mathrm{IGRDNO} - \left(\mathrm{INT}\left(\frac{\mathrm{IGRDNO}}{\mathrm{NCOL}}\right)\right) \times \mathrm{NCOL}$$ or the remainder resulting when IGRDNO is divided by NCOL.

In addition, SPACEMERGE checks for Massachusetts records, such that land use fractions, based on county areas, may be converted to land use fractions by Air Pollution Control Districts. To accomplish this, SPACEMERGE uses information (e.g., NEDS State/APCD Id, column number, row number) in the Massachusetts Adjustment File. This conversion is necessary for compatibility of the spatial factors with area source emissions for Massachusetts.

Two output files are generated by SPACEMERGE: spatial fractions for 14 surrogate categories and a program message file. The input and output file formats are given in Section 4. Refer to Appendix E for the program listing of SPACEMERGE.

Once SPACEMERGE processing is complete, the output data is converted from UNIVAC ASCII to IBM EBCDIC characters. The instructions for the UNIVAC to IBM conversion are given in Section 5, Control Statements.

SAFP NARRATIVE

SAFP (Spatial Allocation Factor Preprocessor) creates spatial allocation factors which are compatible with the Spatial Allocation Module (SAM) of the Flexible Regional Emissions Data System (FREDS). The main function of the program is to match the spatial fractions output from SPACEMERGE to area source categories via a user defined surrogate selection file. The resultant output contains one spatial allocation record for each SCC, state, county, column and row combination. Three input files are accessed by SAFP: the control file, surrogate selection file, and spatial fractions for the surrogate categories (14 for 1980 NAPAP).

The control file defines the number of surrogates contained in the spatial fraction file and the default surrogate to be used when a surrogate category sums to zero at the county level. For 1980 processing, the default surrogate was used for 6.3 percent of the records processed. The surrogate selection file contains the area source category number (SCC) and the surrogate number assigned to each area source SCC.

SAFP reads the control file, surrogate selection file, and for each county, the spatial fractions. The program checks the validity of the spatial fractions by summing over each county. If a surrogate spatial fraction total for a given county equals zero, a default surrogate, defined in the control file, is substituted in. If county totals are less than 95 percent or greater than 105 percent, the program normalizes the fractions to one.

Finally, the input spatial fractions are matched to each area source category and output. Surrogate indicators for each area source SCC are defined by the user. Those used for NAPAP can be found in Table 1-2, as well as various other references.[2,3] Two output files are generated by SAFP: the Spatial Allocation Factor File (SAM input) and a report file summarizing the actions of SAFP. The source code listing for SAFP can be found in Appendix F. The file format and variable descriptions for the Spatial Allocation Factor File are given in Section 4. The report file is printed on the IBM job log.

4.0 INPUT/OUTPUT DESCRIPTION

CREATE7A CONTROL OPTIONS FILE

The control options file for the program CREATE7A (CONTROL7A) consists of three record types: the analysis options records, the master control record, and the control parameters record. The analysis options records control the summary output of program actions. The master control record instructs the program on the geographic summary levels to be accessed from the census file. In the control parameters record, specific census tape processing requirements are requested. Options employed for NAPAP processing are as follows:

LIST
DEBUG
END
ABR-GO
CNTL-X
AYR-GO
NTAPE-1
MAX-default (left blank)
MINCDE-1
MAXCOG-9999
IUPD-0
IBUML-0
IREPL-0
IMIGML-15
LOWL-16

For Massachusetts processing, values for IUPD, ISUML, and IREPL are as follows:

IUPD-1
ISUML-12
IREPL-11

FILE NAME: CREATE7A Control Options File

RECORD NAME/DESCRIPTION: Analysis Record

Page 1 of 1

Record Position

First	Last	Length	Format	Variable Name	Description
1	6	6	A6	Option[a]	Analysis options for program execution. Options may include one or more of the following: LIST, TEST, DEBUG.

---

[a] Analysis options are as follows:

LIST	Lists the values of data elements for the number of input records per state for which the user requests diagnostic information to be displayed (see also the variable LMAX on control parameters record).
TEST	Permits printout of all suppression records. This option is not to be used for final processing runs.
DEBUG	Lists values in the NUMAQR array for the first LMAX records read. Displays values on entry to the 'CATEG', 'SUM', 'OPTIONS', and 'OUTPUT' subroutines for up to LMAX records. Displays input and output values of 'NEDS' subroutine for up to LMAX records.

FILE NAME: CREATE7A Control Options File

RECORD NAME/DESCRIPTION: Master Control Record

Page 1 of 1

Record Position

First	Last	Length	Format	Variable Name	Description
1	5	5	I5	IUPD	Update control switch (=0,1,2,3)[a]
6	10	5	I5	ISUML	Level at which summations for reclassifications may be made.
11	15	5	I5	IREPL	Level of records to be replaced by updates
16	20	5	I5	IHIGHL	Highest level to consider for output allocation record
21	25	5	I5	LOWL	Lowest level to consider for output allocation record

---

[a] 0 = no update
1 = reclassification only (e.g. Massachusetts)
2 = reclassification suppression override
3 = suppression override only.

FILE NAME: CREATE7A Control Options File

RECORD NAME/DESCRIPTION: Control Parameters Record

Page 1 of 2

Record Position

First	Last	Length	Format	Variable Name	Description
1	2	2	A2	ABR	Processing code ST-stop processing; any other charcter strings - continue)
9	10	2	I2	NFST	First state (FIPS) code to be used in inclusive series[a]
12	13	2	I2	NLST	Last state (FIPS) code in inclusive series[a,b]
15	15	1	A1	CNTL	Master control (possible choices include N, R, B, S, or X)[c]
17	18	2	A2	AYR	Census year (last two digits)
20	20	1	I1	NTAPE	Maximum number of files expected per state[d]
22	23	2	I2	LMAX	Number of input records per state for which to display diagnostic information[e]
25	34	10	I10	MAX	Number of input records to process per state (Default - 2,000,000)
36	39	4	F4.0	CRIT	Critical value for suppression (Range: 0.001 to 1.00; Default 0.10)[f]
41	44	4	I4	MINCDE	Minimum vlaue for FIPS code (Default - 1)
46	49	4	I4	MAXCDE	Maximum value for FIPS code (Default - 9999)

---

[a] FIPS STATE:

01	ALABAMA	10	DELAWARE	18	INDIANA
02	ALASKA	11	DIST. OF COL.	19	IOWA
04	ARIZONA	12	FLORIDA	20	KANSAS
05	ARKANSAS	13	GEORGIA	21	KENTUCKY
06	CALIFORNIA	15	HAWAII	22	LOUISIANA
08	COLORADO	16	IDAHO	23	MAINE
09	CONNECTICUT	17	ILLINOIS	24	MARYLAND

FILE NAME: CREATE7A Control Options File

RECORD NAME/DESCRIPTION: Control Parameters Record

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25	MASSACHUSETTS
26	MICHIGAN
27	MINNESOTA
28	MISSISSIPPI
29	MISSOURI
30	MONTANA
31	NEBRASKA
32	NEVADA
33	NEW HAMPSHIRE
34	NEW JERSEY
35	NEW MEXICO
36	NEW YORK
37	NORTH CAROLINA
38	NORTH DAKOTA
39	OHIO
40	OKLAHOMA
41	OREGON
42	PENNSYLVANIA
44	RHODE ISLAND
45	SOUTH CAROLINA
46	SOUTH DAKOTA
47	TENNESSEE
48	TEXAS
49	UTAH
50	VERMONT
51	VIRGINIA
53	WASHINGTON
54	WEST VIRGINIA
55	WISCONSIN
56	WYOMING
72	PUERTO RICO

[b] If these positions are left blank, the program will only process the state given on NFST.

[c] Master Control Options:

N	Normal: no reclassification of emission total units or supression override requirements
R	Reclassification only (e.g., Mass)
B	Reclassification and Suppression
S	Suppression override only
X	Replace one or more defaults for ISUML (0), IREPL (0), IHIGHL (13), LOWL (16). Also give IUPD (0-3).

[d] For 1980 NAPAP, all tapes for any one state should be set up as part of one file.
Therefore, NTAPE should be set to 1.

[e] The range for this value is 0 to 99. Each diagnosis requires 31 to 92 lines.

[f] If the suppression fraction for the total of occupied housing in a given county, parish or AQCR exceeds 'CRIT', a warning flag ('***') will be placed in the corresponsding suppression file record (see subroutine 'ALLOC' and file 'DCFLAG').

*NOTE: Alaska, Hawaii, and Puerto Rico are not to be processed for the NAPAP program. After completion, there should be forty-nine files on each output tape. The first file should be Alabama. The eleventh should be Idaho, and the forty-ninth should be Wyoming.

MASSACHUSETTS UPDATE FILE

The Massachusetts Update file contains hierarchical ordering of Massachusetts townships as they are related to Air Pollution Control Districts (APCDs). This file is necessary for Massachusetts processing since emission totals for the State are reported by APCDs instead of at the county level. Each APCD is composed of a set of townships, one level below each county, which may come from one or more counties. When run with the master control option 'R', the program seeks records from the Massachusetts Update file for instruction on how to assign the various township records as they are encountered. APCD accumulators for population and housing are incremented according to the assignments of the update file. By this process the population and housing totals by APCD can be derived. The program replaces the county records with records generated from within the program containing these totals.

FILE NAME: **Massachusetts Update File**

RECORD NAME/DESCRIPTION: **Update Record**

Page 1 of 1

Record Position

First	Last	Length	Format	Variable Name	Description
1	4	4	I4	IDAQ	FIPS identifier of census entity to be created
6	7	2	I2	LEVELAQ	Level (04 to 16) of existing entity
9	24	16	A16	AQNAME	Name of existing entity

FIPS TO NEDS CODE HASHING TABLE

The FIPS to NEDS code hashing table (IHASH) allows the translation of state and county codes from FIPS to NEDS code. This is necessary as census data are reported by FIPS code, while emissions data are referenced by NEDS (AEROS) ID.

FILE NAME: FIPS To NEDS Code Hashing Table

RECORD NAME/DESCRIPTION: FIPS To NEDS Record

Page 1 of 1

Record Position

First	Last	Length	Format[a]	Variable Name	Description
				CDATE7	Date of hash table creation
				CTIME7	Time of hash table creation
				NCNTY7	Number of County codes in table
				LKEY7	Word length of County Id
				NSIZE7	Number of columns in County Id table
				NPRMT7	Prime number length of County Id table
				IT7(1,I)	NEDS State-County Code (SSCCCC) for entry I
				IT7(2,1)	Link field for entry I
				IT7(3,1)	Index for County Id entry I

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[a] File structure is unformatted (binary)

CENSUS OF POPULATION AND HOUSING, 1980

The Census of Population and Housing 1980: Summary Tape File 3 (STF3A) contains the input data to be processed by the program CREATE7A. The format and field descriptions for this file were obtained from the "Census of Population and Housing, 1980: Summary Tape File 3 Technical Documentation".[4] For further information the user should refer to this document.

FILE NAME: STF3A[4]

RECORD NAME/DESCRIPTION: Record 01
Page 1 of 95

Record Position

First	Last	Length	Type	Name	Description
1	5	5	A	FILEID	Identifier for summary file, i.e., STF3A (Summary Tape File 3A)
6	9	4	A	RECTYP	N/A to STF3; field is blank
10	11	2	A	SUMRYLVL	Identifies geographic level of current record: 01 United States 02 Region 03 Division 04 State 05 SCSA 06 SCSA/State 07 SMSA 08 SMSA/State 09 Urbanized area 10 Urbanized area/State 11 State/County 12 State/County/MCD (CCD) 13 State/County/MCD (CCD)/Place 14 State/County/MCD (CCD)/Place/Tract (BNA) 15 State/County/MCD (CCD)/Place/Tract (BNA)/BG 16 State/County/MCD (CCD)/Place/Tract (BNA)/ED 17 State/SMSA/County 18 State/SMSA/County/MCD (CCD) 19 State/SMSA/County/MCD (CCD)/Place 20 State/SMSA/County/MCD (CCD)/Place/Tract (BNA) 21 State/SMSA/County/MCD (CCD)/Place/Tract (BNA)/Block 22 State/SMSA/County/MCD (CCD)/Place/Tract (BNA)/ED

Record Position

First	Last	Length	Type	Name		Description
					23	State/SMSA/County/Place
					24	State/SMSA/County/Place/Tract (BNA)
					25	State/SMSA/County/Place/Tract (BNA)/Block
					26	State/SMSA/County/Place/Tract (BNA)/ED
					27	State/Place
					28	State/MCD sequence number
					29	Indian Reservation (ANV)
					30	Indian Reservation (ANV)/State
					31	Indian Reservation (ANV)/State/County
					32	State/SMSA/County/Tract (BNA)
					33	State/Congressional District
					35	5-digit zip within state
					36	5-digit zip state/SMSA/County
					37	State/Congressional District/County
					38	State/Congressional District/County/Place
					39	State/Congressional District/County/MCD
12	13	2	A	URBARURL		Urban and rural component:
					00	Not urban and rural component
					01	Urban
					02	Inside urbanized areas
					03	Central cities
					04	Urban fringe
					05	Outside urbanized areas
					06	Places of 10,000 or more
					07	Places of 2,500 to 10,000
					08	Rural
					09	Places of 1,000 to 2,500
					10	Other rural
					11	Farm
14	15	2	A	SMSACOM		N/A to STF3; field is blank
16	17	2	A	RACESPAN		N/A to STF3; field is blank

FILE NAME: STF3A[4]

RECORD NAME/DESCRIPTION: Record 01
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Record Position

First	Last	Length	Type	Name		Description
18	20	3	A	ANCESTRY		N/A to STF3; field is blank
21	21	1	A	BLOCKPT		N/A to STF3; field is blank
22	22	1	A	FSTATUS		Functional status code:
					A	Active governmental unit recognized for revenue sharing, except semi-independent places, Indian Reservations and Alaska Native Villages
					B	Active governmental unit, not recognized for revenue sharing
					C	Semi-independent place
					I	Inactive governmental unit
					N	Nonfunctioning governmental unit
					S	Statistical entity
					F	False entity
					R	Indian Reservation or Alaska Native Village, recognized for revenue sharing
					Q	Indian Reservation or Alaska Native Village, not recognized for revenue sharing
23	23	1	A	FLAG1		N/A to STF3; field is blank
24	24	1	A	PARTCOU		N/A to STF3; field is blank
25	25	1	A	FILL1		Filler
26	26	1	A	PART		Applicable only to STF3D
27	28	2	A	FILL2		Filler
29	29	1	A	PSAD		Political/Statistical area description:

FILE NAME: STF3A[4]

RECORD NAME/DESCRIPTION: Record 01
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Record Position

First	Last	Length	Type	Name	Description
					A County
					B Borough
					C City
					D District (admininistrative, assessment, election, magisterial, or supervisor's)
					E Consolidated government
					F Census county division
					G Gore
					H Independent city
					I Indian Reservation
					J Unorganized territory
					K Parish
					L Plantation
					M Location
					N (None)
					P Election precinct
					Q Quadrant
					R Purchase
					S Township
					T Town
					U Census designated place
					V Village
					W Police jury ward
					X Grant
					Y Census area
					Z Census subarea
					1 Island
					2 Census subdistrict
					3 Municipio
					4 Barrio
					5 Ciudad
					6 Pueblo
					7 Aldea
					8 Zona urbana
					9 Municipality
30	30	1	A	QUASIST	N/A to STF3; field is blank

FILE NAME: STF3A[4]

RECORD NAME/DESCRIPTION: Record 01
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Record Position

First	Last	Length	Type	Name		Description
31	31	1	A	REGION		Region code
					1	Northeast
					2	North Central
					3	South
					4	West
32	32	1	A	DIVISION		Division code--This is the first digit of the geographic state code:
					1	New England
					2	Middle Atlantic
					3	East North Central
					4	West North Central
					5	South Atlantic
					6	East South Central
					7	West South Central
					8	Mountain
					9	Pacific
32	33	2	A	STATEGEO		Census state code (with Division code above):
					63	Alabama
					94	Alaska
					86	Arizona
					71	Arkansas
					93	California
					84	Colorado
					16	Connecticut
					51	Delaware
					53	District of Columbia
					59	Florida
					58	Georgia
					95	Hawaii
					82	Idaho
					33	Illinois
					32	Indiana
					42	Iowa
					47	Kansas

Record Position

First	Last	Length	Type	Name	Description
					61 Kentucky
					72 Louisiana
					11 Maine
					52 Maryland
					14 Massachusetts
					34 Michigan
					41 Minnesota
					64 Mississippi
					43 Missouri
					81 Montana
					46 Nebraska
					88 Nevada
					12 New Hampshire
					22 New Jersey
					85 New Mexico
					21 New York
					56 North Carolina
					44 North Dakota
					31 Ohio
					73 Oklahoma
					92 Oregon
					23 Pennsylvania
					15 Rhode Island
					57 South Carolina
					45 South Dakota
					62 Tennessee
					74 Texas
					87 Utah
					13 Vermont
					54 Virginia
					91 Washington
					55 West Virginia
					35 Wisconsin
					83 Wyoming
					06 Puerto Rico
34	35	2	A	STATE	FIPS state code:
					01 Alamaba
					02 Alaska

FILE NAME: STF3A[4]

RECORD NAME/DESCRIPTION: Record 01
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Record Position

First	Last	Length	Type	Name	Description
					04 Arizona
					05 Arkansas
					06 California
					08 Colorado
					09 Connecticut
					10 Delaware
					11 District of Columbia
					12 Florida
					13 Georgia
					15 Hawaii
					16 Idaho
					17 Illinois
					18 Indiana
					19 Iowa
					20 Kansas
					21 Kentucky
					22 Louisiana
					23 Maine
					24 Maryland
					25 Massachusetts
					26 Michigan
					27 Minnesota
					28 Mississippi
					29 Missouri
					30 Montana
					31 Nebraska
					32 Nevada
					33 New Hampshire
					34 New Jersey
					35 New Mexico
					36 New York
					37 North Carolina
					38 North Dakota
					39 Ohio
					40 Oklahoma
					41 Oregon
					42 Pennsylvania
					44 Rhode Island
					45 South Carolina
					46 South Dakota

FILE NAME: STF3A[4]

RECORD NAME/DESCRIPTION: Record 01
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Record Position

First	Last	Length	Type	Name	Description
					47 Tennessee 48 Texas 49 Utah 50 Vermont 51 Virginia 53 Washington 54 West Virginia 55 Wisconsin 56 Wyoming 72 Puerto Rico
36	39	4	A	SMSA	FIPS standard metropolitan statistical area (SMSA) code
40	42	3	A	COUNTY	FIPS county code
43	45	3	A	MCD	Minor civil division/Census county division (MCD/CCD) code
46	49	4	A	PLACE	Census geographic place code 9999 in this field indicates balance of higher level entity outside of place; e.g., remainder of MCD or of county.
50	55	6	A	TRACT	Tract or block numbering area (BNA) code Tract is a four-digit basic code with implied decimal and 2-digit suffix. 999999 in this field indicates untracted remainder of a higher level entity; e.g., remainder of MCD.

FILE NAME: STF3A[4]

RECORD NAME/DESCRIPTION: Record 01
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Record Position

First	Last	Length	Type	Name	Description
50	53	4	A	TRACT4	Tract or block numbering area (BNA) This is the 4-digit basic code. BNA summaries are numbered between 9901 and 9989.
54	55	2	A	TRACT2	Tract or block numbering area (BNA) This is the 2-digit suffix code. Blank if not used.
56	56	1	A	BLKGRP	Block group code (first digit of block number)
56	58	3	A	BLOCK	N/A to STF 3; field is blank
59	59	1	A	PARTPLAC	Place/Part indicator This indicator will appear on records which may contain data for a part of a place: 0 Neither place, nor place segment record 1 Split 2 Not split
60	60	1	A	PARTTRCT	Tract/Part indicator This indicator will appear on records which may contain data for a part of a tract or BNA: 0 Neither Tract/BNA, nor Tract/BNA segment record 1 Split 2 Not split
61	61	1	A	PARTBLK	N/A to STF3; field is blank

FILE NAME: STF3A[4]

RECORD NAME/DESCRIPTION: Record 01
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Record Position

First	Last	Length	Type	Name	Description
62	62	1	A	EDIND	Enumeration district indicator prefix: Field is blank if ED is none of those listed below: A Historic areas of Oklahoma (excluding urbanized areas); disregard all other areas. M Military Reservation N American Indian Reservation P National or State park or forest lands S Other special place V Crews of vessels
63	66	4	A	EDNUMBER	Enumeration district number (ED) code
67	67	1	A	EDSUFFIX	Enumeration district suffix If applicable, contains an alphabetic character A-Z. Otherwise, suffix will be blank.
68	69	2	A	SCSA	FIPS standard consolidated statistical area (SCSA) code
70	73	4	A	URBAREA	Urbanized area (UA) code
74	75	2	A	CONDIST	Congressional district (CD) code
76	78	3	A	INDANV	Indian Reservation/Alaska Native Village (ANV) code
79	82	4	A	MCDSEQNO	MCD sequence number (available in 11 states)
83	87	5	A	ZIP	5-digit zip code
88	89	2	A	WARD	Ward

FILE NAME: STF3A[4]

RECORD NAME/DESCRIPTION: Record 01
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Record Position

First	Last	Length	Type	Name	Description
90	91	2	A	SEA	State economic area (SEA) code
92	94	3	A	ESR	Economic sub-region (ESR) code
95	98	4	A	DOFFICE	District office code If data for this summary were collected from more than one district office, this code will contain "9999".
99	102	4	A	SEQOID	Sequence identifier First two digits (99-100) identify the sequence of this record segment as a part of the census logical record. Second two digits (101-102) identify the total number of record segments for each census logical record. The first 102 characters of the data will appear on each record segment of the user tapes. The following geographic descriptive data will appear on only the first record segment for a given summary.
103	103	1	A	SMSASIZE	Standard metropolitan statistical area (SMSA) size code: Zero or blank if not in an SMSA 1 Under 100,000 2 100,000-249,999 3 250,000-499,999 4 500,000-999,999 5 1,000,000-2,999,999 6 3,000,000-14,999,999 7 15,000,000 or more 9 Split by SMSA boundary

Record Position

First	Last	Length	Type	Name		Description
104	104	1	A	UATYPE		Urbanized area (UA) type:
					0	Area is in a UA whose largest central city has less than 50,000 population
					1	Area is in a UA with at least one central city that has a population of 50,000 or more
					9	This area is split by UA type
105	105	1	A	UASIZE		Urbanized area (UA) size code:
						Zero or blank if not in UA
					1	Under 100,000
					2	100,000-249,999
					3	250,000-499,999
					4	500,000-999,999
					5	1,000,000-2,999,999
					6	3,000,000-14,999,999
					7	15,000,000 or more
					9	Split by SMSA boundary
106	106	1	A	PLACDESC		Place description:
					1	Incorporated central city of SMSA not UA
					2	Incorporated central city of UA not SMSA
					3	Incorporated central city of SMSA and UA
					4	Other incorporated place
					9	Not place; part of MCD/CCD
					A	Census designated place, central city of UA not SMSA
					B	Census designated place, central city of SMSA and UA
					C	Census designated place in UA with CC of 50,000 or more
					E	Census designated place coextensive with MCD or county

FILE NAME: STF3A[4]

RECORD NAME/DESCRIPTION: Record 01
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Record Position

First	Last	Length	Type	Name		Description
					F	Census designated place of 1,000 or more, not in UA or CDP in UA with CC of 50,000 or less
					G	CDP in Hawaii and outlying areas
					H	CDP in Alaska
					I	Zona Urbana in Puerto Rico
107	108	2	A	PLACESZE		Place size:
					00	Not in a place
					01	Under 200
					02	200-499
					03	500-999
					04	1,000-1,499
					05	1,500-1,999
					06	2,000-2,499
					07	2,500-4,999
					08	5,000-9,999
					09	10,000-19,999
					10	20,000-24,999
					11	25,000-49,999
					12	50,000-99,999
					13	100,000-249,999
					14	250,000-499,999
					15	500,000-999,999
					16	1,000,000 or more
109	109	1	A	XCITY		Extended city indicator code
						A blank indicates not applicable or summary is not a place or part of a place which is partially urban and partially rural.
					X	This summary is for a place or part of a place which is partially urban and partially rural

FILE NAME: STF3A[4]

RECORD NAME/DESCRIPTION: Record 01
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Record Position

First	Last	Length	Type	Name		Description
110	110	1	A	CBD		Central business district
						Field is blank if area is not in a central business district.
					C	Central business district
111	112	2	A	MCDCCDSZ		Minor civil division/Census county division (MCD/CCD) size code:
					01	Under 200
					02	200-499
					03	500-999
					04	1,000-1,499
					05	1,500-1,999
					06	2,000-2,499
					07	2,500-4,999
					08	5,000-9,999
					09	10,000-19,999
					10	20,000-24,999
					11	25,000-49,999
					12	50,000-99,999
					13	100,000-249,999
					14	250,000-499,999
					15	500,000-999,999
					16	1,000,000 or more
113	115	3	A	INDSUBR		Indian subreservation
116	120	5	A	FIPSPLAC		N/A to STF3; field is blank
121	122	2	A	SFAR		Standard federal administrative region
123	129	7	A	LONGITUD		Longitude[a]
130	135	6	A	LATITUDE		Latitude[a]
136	144	9	A	LANDAREA		Land area (square kilometers) to the nearest tenth)[a]

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[a] Received from Bureau of Census as blank fields. EPA incorporated these values into the file using the MARF2.

FILE NAME: STF3A[4]

RECORD NAME/DESCRIPTION: Record 01
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Record Position

First	Last	Length	Type	Name	Description
145	204	60	A	AREANAME	Area name
205	205	1	A	SUPFLG01	Total population suppression flag: A 1 in this field indicates suppression because there are fewer than 30 persons in the geographic area being summarized. The following tables will be affected: 15 19 22 24-44 45 (cells 1-4) 47 48 (cells 1-5) 50-54 55 (cells 1-8) 57-61 62 (cells 1-2) 64-67 81-85 89-90 91 (cells 1-2) 93-95 100 104 0 No suppression 1 Suppression
206	206	1	A	SUPFLG02	White population suppression flag A 1 in this field indicates suppression because there are fewer than 30 white persons in the geographic area being summarized or complementary suppression is applied. It will affect the following tables:

Record Position

First	Last	Length	Type	Name	Description
					16 (cells 1-10) 45 (cells 5-8) 48 (cells 6-10) 55 (cells 9-16) 62 (cells 3-4) 91 (cells 3-4) 0 No suppression 1 Suppression
207	207	1	A	SUPFLG03	Black population suppression flag A 1 in this field indicates suppression because there are fewer than 30 black persons in the geographic area being summarized or complementary suppression is applied. It will affect the following tables: 16 (cells 11-20) 45 (cells 9-12) 48 (cells 11-15) 55 (cells 17-24) 62 (cells 5-6) 91 (cells 5-6) 0 No suppression 1 Suppression
208	208	1	A	SUPFLG04	American Indian, Eskimo, and Aleut suppression flag Al in this field indicates suppression because there are fewer than 30 American Indians, Eskimos, and Aleuts in the geographic area being summarized or complementary suppression is applied. It will affect the following tables:

Record Position

First	Last	Length	Type	Name	Description
					16 (cells 21-30) 45 (cells 13-16) 48 (cells 16-20) 55 (cells 25-32) 62 (cells 7-8) 91 (cells 7-8) 0 No suppression 1 Suppression
209	209	1	A	SUPFLG05	Asian and Pacific Islander suppression flag A 1 in this field indicates suppression because there are fewer than 30 Asian and Pacific Islanders in the geographic area being summarized or complementary suppression is applied. It will affect the following tables: 16 (cells 31-40) 45 (cells 17-20) 48 (cells 21-25) 55 (cells 33-40) 62 (cells 9-10) 91 (cells 9-10) 0 No suppression 1 Suppression
210	210	1	A	SUPFLG06	Spanish population suppression flag A 1 in this field indicates suppression because there are fewer than 30 persons of Spanish origin in the geographic area being summarized or complementary suppression is applied. It will affect the following tables:

FILE NAME: STF3A[4]

RECORD NAME/DESCRIPTION: Record 01
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Record Position

First	Last	Length	Type	Name	Description
					17 46 49 56 63 92 0 No suppression 1 Suppression
211	211	1	A	SUPFLG07	Year-round housing unit suppression flag A 1 in this field indicates suppression because there are fewer than 10 year-round housing units in the geographic area being summarized or complementary suppression is applied. It will affect the following tables: 101 102 (cells 1-6) 105-108 109 (cells 1-7) 111 115 116 (cells 1-6) 117 (cells 1-4) 120 0 No suppression 1 Suppression
212	212	1	A	SUPFLG08	Occupied housing unit suppression flag A 1 in this field indicates suppression because there are fewer than 10 occupied housing units in the geographic area being summarized or complementary suppression is applied. It will affect the following tables:

Record Position

First	Last	Length	Type	Name	Description
					9
					18
					20 (cells 1-7)
					23
					68-74
					77 (cell 1)
					79
					80
					86-88
					97 (cell 2)
					102 (cells 7-12)
					109 (cells 8-14)
					110 (cells 1-6)
					112-114
					116 (cells 7-12)
					117 (cells 5-8)
					118 (cells 1-2)
					119
					121 (cell 1)
					123
					141 (cell 1)
					142
					143 (cell 1)
					145 (cell 1)
					147 (cell 1)
					149 (cell 1)
				0	No suppression
				1	Suppression
213	213	1	A	SUPFLG09	Occupied housing unit with white householder suppression flag A 1 in this field indicates suppression because there are fewer than 10 white householders in the geographic area being summarized or complementary suppression is applied. It will affect the following tables:

Record Position					
First	Last	Length	Type	Name	Description
					20 (cells 8-14) 75 (cells 1-9) 77 (cell 2) 98 (cell 6) 121 (cell 2) 143 (cell 2) 145 (cell 2) 147 (cell 2) 149 (cell 2) 0 No suppression 1 Suppression
214	214	1	A	SUPFLG10	Occupied housing unit with black householder suppression flag A 1 in this field indicates suppression because there are fewer than 10 black householders in the geographic area being summarized or complementary suppression is applied. It will affect the following tables: 20 (cells 15-21) 75 (cells 10-18) 77 (cell 3) 98 (cell 7) 121 (cell 3) 143 (cell 3) 145 (cell 3) 147 (cell 3) 149 (cell 3) 0 No suppression 1 Suppression
215	215	1	A	SUPFLG11	Occupied housing unit with American Indian, Eskimo, and Aleut householder suppression flag

Record Position

First	Last	Length	Type	Name	Description
					A 1 in this field indicates suppression because there are fewer than 10 American Indian, Eskimo, and Aleut householders in the geographic area being summarized or complementary suppression is applied. It will affect the following tables: 20 (cells 22-28) 75 (cells 19-27) 77 (cell 4) 98 (cell 8) 121 (cell 4) 143 (cell 4) 145 (cell 4) 147 (cell 4) 149 (cell 4)
					0 No suppression 1 Suppression
216	216	1	A	SUPFLG12	Occupied housing unit with Asian and Pacific Islander householder suppression flag A 1 in this field indicates suppression because there are fewer than 10 Asian and Pacific Islander householders in the geographic area being summarized or complementary suppression is applied. It will affect the following tables: 20 (cells 29-35) 75 (cells 28-36) 77 (cell 5) 98 (cell 9) 121 (cell 5) 143 (cell 5) 145 (cell 5) 147 (cell 5) 149 (cell 5)

FILE NAME: STF3A[4]

RECORD NAME/DESCRIPTION: Record 01
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Record Position					
First	Last	Length	Type	Name	Description
					0 No suppression 1 Suppression
217	217	1	A	SUPFLG13	Other race householder A 1 in this field indicates suppression because there are fewer than 10 householders in the other race category in the geographic area being summarized or complementary suppression is applied. This affects the following table: 98 (cell 10) 0 No suppression 1 Suppression
218	218	1	A	SUPFLG14	Occupied housing unit with Spanish origin householder suppression flag A 1 in this field indicates suppression because there are fewer than 10 Spanish origin householders in the geographic area being summarized or complementary suppression is applied. This affects the following tables: 21 76 78 99 (cell 2) 122 144 146 148 150 0 No suppression 1 Suppression

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Record Position

First	Last	Length	Type	Name	Description
219	219	1	A	SUPFLG15	Owner-occupied housing unit suppression flag A 1 in this field indicates suppression because there are fewer than 10 housing units in the owner-occupied category of the geographic area being summarized or complementary suppression is applied. This affects the following tables: 133 134 137-140 0 No suppression 1 Suppression
220	220	1	A	SUPFLG16	Owner-occupied housing unit with white householder suppression flag A 1 in this field indicates suppression because there are fewer than 10 white householders in the owner-occupied category of the geographic area being summarized or complementary suppression is applied. This affects the following table: 135 (cells 1-6) 0 No suppression 1 Suppression
221	221	1	A	SUPFLG17	Owner-occupied housing unit with black householder suppression flag

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Record Position

First	Last	Length	Type	Name		Description
						A 1 in this field indicates suppression because there are fewer than 10 black householders in the owner-occupied category of the geographic area being summarized or complementary suppression is applied. This affects the following table: 135 (cells 7-12)
					0	No suppression
					1	Suppression
222	222	1	A	SUPFLG18		Owner-occupied housing unit with American Indian, Eskimo, and Aleut householder suppression flag
						A 1 in this field indicates suppression because there are fewer than 10 American Indian, Eskimo, and Aleut householders in the owner-occupied category of the geographic area being summarized or complementary suppression is applied. This affects the following table: 135 (cells 13-18)
					0	No suppression
					1	Suppression
223	223	1	A	SUPFLG19		Owner-occupied housing unit with Asian and Pacific Islander householder suppression flag
						A 1 in this field indicates suppression because there are fewer than 10 Asian and Pacific Islander householders in the owner-occupied category of the geographic area being summarized or complementary suppression is applied. This affects the following table:

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Record Position

First	Last	Length	Type	Name	Description
					135 (cells 19-24) 0 No suppression 1 Suppression
224	224	1	A	SUPFLG20	Owner-occupied housing unit with Spanish householder suppression flag A 1 in this field indicates suppression because there are fewer than 10 Spanish origin householders in the owner-occupied category of the geographic area being summarized or complementary suppression is applied. This affects the following table: 136 0 No suppression 1 Suppression
225	225	1	A	SUPFLG21	Renter-occupied housing unit suppression flag A 1 in this field indicates suppression because there are fewer than 10 housing units in the renter-occupied category of the geographic area being summarized or complementary suppression is applied. This affects the following tables: 124 127-132 0 No suppression 1 Suppression

Record Position

First	Last	Length	Type	Name		Description
226	226	1	A	SUPFLG22		Renter-occupied housing unit with white householder suppression flag
						A 1 in this field indicates suppression because there are fewer than 10 white householders in the renter-occupied category of the geographic area being summarized or complementary suppression is applied. This affects the following table: 125 (cells 1-5)
					0	No suppression
					1	Suppression
227	227	1	A	SUPFLG23		Renter-occupied housing unit with black householder suppression flag
						A 1 in this field indicates suppression because there are fewer than 10 black householders in the renter-occupied category of the geographic area being summarized or complementary suppression is applied. This affects the following table: 125 (cells 6-10)
					0	No suppression
					1	Suppression
228	228	1	A	SUPFLG24		Renter-occupied housing unit with American Indian, Eskimo, and Aleut suppression flag

Record Position

First	Last	Length	Type	Name	Description
					A 1 in this field indicates suppression because there are fewer than 10 American Indian, Eskimo, and Aleut householders in the renter-occupied category of the geographic area being summarized or complementary suppression is applied. This affects the following table: 125 (cells 11-15) 0 No suppression 1 Suppression
229	229	1	A	SUPFLG25	Renter-occupied housing unit with Asian and Pacific Islander suppression flag A 1 in this field indicates suppression because there are fewer than 10 Asian and Pacific Islander householders in the renter-occupied category of the geographic area being summarized or complementary suppression is applied. This affects the following table: 125 (cells 16-20) 0 No suppression 1 Suppression
230	230	1	A	SUPFLG26	Renter-occupied housing unit with Spanish householder suppression flag

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Record Position

First	Last	Length	Type	Name	Description
					A 1 in this field indicates suppression because there are fewer than 10 housing units in the renter-occupied category of the geographic area being summarized or complementary suppression is applied. This affects the following table: 126 0 No suppression 1 Suppression
231	231	1	A	SUPFLG27	Owner/renter-occupied housing unit suppression flag A 1 in this field indicates suppression because there are fewer than 10 housing units in either or both the owner and renter categories of the geographic area being summarized or complementary suppression is applied. This affects the following tables: 102 (cells 13-18) 109 (cells 16-21) 110 (cells 7-12) 116 (cells 13-18) 117 (cells 9-12) 118 (cells 3-4) 141 (cells 2) 0 No suppression 1 Suppression
232	252	21	A	FILL4	Filler

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Record Position

First	Last	Length	Type	Name	Description
253	279	9 (3 cells)	N	TAB1	Urban and rural This table has no suppression. Universe: Persons. Note: To obtain urban count, subtract rural from total. See footnote 50. Total Inside urbanized areas Rural
280	288	9	N	TAB2	Unweighted sample count of persons This table has no suppression. Universe: Unweighted sample count of persons. Unweighted sample count of persons.
289	297	9	N	TAB3	100-percent count of persons This table has no suppression Universe: 100-percent count of persons. See footnote 38. 100-percent count of persons
298	324	9 (3 cells)	N	TAB4	Urban and Rural This table has no suppression. Universe: Housing units (including vacant seasonal and migratory units). Note: to obtain urban count, subtract rural from total. See footnotes 1, 50.

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Record Position

First	Last	Length	Type	Name	Description
					Total Inside urbanized areas Rural
325	333	9	N	TAB5	Unweighted sample count of housing units (including vacant seasonal and migratory units) This table has no suppression. Universe: Unweighted sample count of housing units (including vacant seasonal and migratory units). See footnote 1. Unweighted sample count of housing units (including vacant seasonal and migratory units)
334	342	9	N	TAB6	100-percent count of housing units (including vacant seasonal and migratory units This table has no suppression. Universe: 100-percent count of housing units (including vacant seasonal and migratory units). See footnotes 1, 38. 100-percent count of housing units (including vacant seasonal and migratory units)
343	360	9 (2 cells)	N	TAB7	Farm residence (current farm definition) This table has no suppression. Universe: Persons in rural areas See footnote 2.

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Record Position

First	Last	Length	Type	Name	Description
					Rural farm Nonfarm
361	378	9 (2 cells)	N	TAB8	Farm residence (1970 census farm definition) This table has no suppression. Universe: Persons in rural areas. See footnote 2. Rural farm Nonfarm
379	387	9	N	TAB9	Families SUPFLG08 applies to all cells Universe: Families. Families
388	396	9	N	TAB10	Households This table has no suppression. Universe: Households. See footnote 3. Households
397	423	9 (3 cells)	N	TAB11	Occupancy status This table has no suppression. Universe: Year-round housing units. See footnote 3. Total Occupied Vacant

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Record Position

First	Last	Length	Type	Name	Description
424	576	9 (17 cells)	N	TAB12	Occupancy Status This table has no suppression. Universe: Persons. See footnotes 4, 5, 6, 47,53. White Black American Indian, Eskimo, and Aleut: American Indian Eskimo Aleut Asian and Pacific Islander: Japanese Chinese Filipino Korean Asian Indian Vietnamese Hawaiian Guamanian Samoan Other Other (race N.E.C.): Spanish Not Spanish
577	630	9 (6 cells)	N	TAB13	Spanish origin and race This table has no suppression. Universe: Persons. See footnotes 4, 5. Not of Spanish origin Mexican Puerto Rican Cuban Other Spanish: White, black, American Indian, Eskimo, Aleut, and Asian and Pacific Islander Other (race N.E.C.)

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Record Position

First	Last	Length	Type	Name	Description
631	675	9 (5 cells)	N	TAB14	Race This table has no suppression. Universe: Persons of Spanish origin. See footnotes 4, 5. Total White Black American Indian, Eskimo, Aleut, and Asian and Pacific Islander Other (race N.E.C.)
676	1143	9 (52 cells)	N	TAB15	Sex (2) by age (26) SUPFLG01 applies to all cells Universe: Persons. The stratifiers are sex by age: Total: Under 1 year 1 and 2 years 3 and 4 years 5 years 6 years 7 to 9 years 10 to 13 years 14 years 15 years 16 years 17 years 18 years 19 years 20 years 21 years 22 to 24 years 25 to 29 years 30 to 34 years 35 to 44 years 45 to 54 years

Record Position

First	Last	Length	Type	Name	Description
					55 to 59 years 60 and 61 years 62 to 64 years 65 to 74 years 75 to 84 years 85 years and over Female: Repeat age (26)
1144	1503	9 (40 cells)	N	TAB16	Race (4) by sex (2) by age (5) SUPFLG02 applies to cells 1-10. SUPFLG03 applies to cells 11-20. SUPFLG04 applies to cells 21-30. SUPFLG05 applies to cells 31-40. Universe: Persons of specified races. See footnote 4. The stratifiers are: race by sex by age White: Total Under 5 years 5 to 14 years 15 to 59 years 60 to 64 years 65 years and over Female: Repeat age (5) Black: Repeat sex by age (10) American Indian, Eskimo, and Aleut: Repeat sex by age (10) Asian and Pacific Islander: Repeat sex by age (10)

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Record Position

First	Last	Length	Type	Name	Description
1504	1593	9 (10 cells)	N	TAB17	Sex (2) by age (5) SUPFLG06 applies to all cells. Universe: Persons of Spanish origin. The stratifiers are: sex by age Total Under 5 years 5 to 14 years 15 to 59 years 60 to 64 years 65 years and over Female: Repeat age (5)
1594	1647	9 (6 cells)	N	TAB18	Persons in household SUPFLG08 applies to all cells. Universe: Households. See footnote 7. 1 person 2 persons 3 persons 4 persons 5 persons 6 or more persons
1648	1728	9 (9 cells)	N	TAB19	Household type and relationship SUPFLG01 applies to all cells. Universe: Persons. See footnotes 8, 9. In family household: Householder Spouse Other relatives Nonrelatives

Record Position

First	Last	Length	Type	Name	Description
					In nonfamily household: Male householder Female householder Nonrelatives In group quarters: Inmate of institution other
1729	2016	288	A	FILL5	Filler
2017	2118	102	A	UIS1	Universal identifier section; the characters in this field are identical to the first 102 characters of the record.
2119	2433	9 (35 cells)	N	TAB20	Race of householder (5) by household type and presence of own children (7) SUPFLG08 applies to cells 1-7. SUPFLG09 applies to cells 8-14. SUPFLG010 applies to cells 15-21. SUPFLG011 applies to cells 22-28. SUPFLG012 applies to cells 29-35. Universe: households. See footnotes 4, 10, 11. The stratifiers are race of householder by household type and presence of own children: Total Married-coupled family: With own children without own children Family with male householder, no wife present: With own children Without own children

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Record Position

First	Last	Length	Type	Name	Description

					Family with female householder, no husband present:
					  With own children
					  Without own children
					Nonfamily household
					White:
					  Repeat household type and presence of own children (7)
					Black:
					  Repeat household type and presence of own children (7)
					American Indian, Eskimo, and Aleut:
					  Repeat household type and presence of own children (7)
					Asian and Pacific Islander:
					  Repeat household type and presence of own children (7)

2434	2496	9
		(7 cells)
			N	TAB21	Household type and presence of own children
					
					SUPFLG14 applies to all cells.
					  Universe: households with householder of Spanish origin.
					See footnotes 10 11.
					
					  Married-Couple Family:
					    with own children
					    without own children
					  Family with male householder, no wife present:
					    with own children
					    without own children
					  Family with female householder, no husband present:
					    with own children
					    without own children
					  Nonfamily household

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Record Position

First	Last	Length	Type	Name	Description
2497	2541	15 (3 cells)	N	TAB22	Family type SUPFLG01 applies to all cells. Universe: own children. See footnotes 10, 12. In married-couple family In family with male householder, no wife present In family with female householder, no husband present
2542	2577	9 (4 cells)	N	TAB23	Subfamily type and presence of own children SUPFLG08 applies to all cells. Universe: subfamilies. See footnote 10. Married-couple subfamily: with own children without own children Father-child subfamily Mother-child subfamily
2578	2592	15	N	TAB24	Aggregate number of own children in married-couple subfamilies SUPFLG01 applies to all cells. Universe: aggregate number of own children in married-couple subfamilies. See footnotes 10, 12. Aggregate number of own children in married-couple subfamilies
2593	2607	15	N	TAB25	Persons in subfamilies

Record Position

First	Last	Length	Type	Name	Description
					SUPFLG01 applies to all cells. Universe: persons in subfamilies. See footnote 12. Persons in subfamilies
2608	2697	9 (10 cells)	N	TAB26	Sex (2) by marital status (5) SUPFLG01 applies to all cells. Universe: persons 15 years and over. The stratifiers are sex by marital status: Male: Single Now married, except separated Separated Widowed Divorced Female: Repeat marital status (5)
2698	2787	9 (10 cells)	N	TAB27	Age (2) by language spoken at home and ability to speak English (5) SUPFLG01 applies to all cells. Universe: persons 5 years and over. See footnotes 39, 53. The stratifiers are age by language spoken at home and ability to speak English: 5 to 17 years: speak only English at home speak a language other than English at home:

Record Position

First	Last	Length	Type	Name	Description
					Spanish language spoken at home: Speak English very well or well Speak English not well or not at all Other language spoken at home (all other codes): (Repeat ability to speak English) 18 years and over: repeat language spoken at home and ability to speak English (5)
2788	2958	9 (19 cells)	N	TAB28	Ancestry SUPFLG01 applies to all cells. Universe: persons. See footnotes 13, 40, 49, 53. Single Ancestry Group: Dutch (Codes 14, 15) English (Codes 16-18, 96, 97) French (Codes 28-31, 98) German (Codes 32-44) Greek (Codes 46-48) Hungarian (Codes 113, 114) Irish (Code 50) Italian (Codes 52-73) Norwegian (Code 78) Polish (Codes 122-124) Portuguese (Codes 79-81) Russian (Codes 140-156) Scottish (Code 20) Swedish (Code 82) Ukrainian (Code 166) Other (All other single ancestry codes) Multiple ancestry group

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Record Position

First	Last	Length	Type	Name	Description
					Ancestry not specified: Other Not reported
2959	3012	9 (6 cells)	N	TAB29	Ancestry SUPFLG01 applies to all cells. Universe: persons in selected multiple ancestry groups. See footnotes 14, 40. English and other group(s) Frensh and other group(s) German and other group(s) Irish and other group(s) Italian and other group(s) Polish and other group(s)
3013	3066	9 (6 cells)	N	TAB30	Age (3) by marital status (2) SUPFLG01 applies to all cells. Universe: females 15 to 44 years. See footnote 15. The stratifiers are age by marital status: 15 to 24 years: single ever married 25 to 34 years: repeat marital status (2) 35 to 44 years: repeat marital status (2)
3067	3111	15 (3 cells)	A	TAB31	Aggregate number of children ever born by age SUPFLG01 applies to all cells. Universe: females 15 to 44 years. See footnote 12.

Record Position

First	Last	Length	Type	Name	Description
					15 to 24 years 25 to 34 years 35 to 44 years
3112	3165	9 (6 cells)	A	TAB32	Type of group quarters SUPFLG01 applies to all cells. Universe: persons in group quarters. See footnote 41. Inmate of mental hospital (Codes 45-48) Inmate of home for the aged (Codes 60-65, 71-75) Inmate of other institution (Codes 1-5, 10-17, 20-27, 29-42, 50-53, 55) Cell not used 55/ In college dormitory (Code 87) Other in group quarters (Codes 80-86, 89, 91-93, 95-98)
3166	3201	9 (4 cells)	A	TAB33	Nativity and place of birth SUPFLG01 applies to all cells. Universe: Persons. Native: Born in state of residence Born in different state Born abroad, at sea, etc. Foreign born
3202	3273	9 (8 cells)	A	TAB34	Residence in 1975--State and County level SUPFLG01 applies to all cells. Universe: Persons 5 years and over.

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Record Position

First	Last	Length	Type	Name	Description
					Same house Different house in United States Same county Different county: Same state Different state: Northeast North central South West Abroad
3274	3327	9 (6 cells)	A	TAB35	Residence in 1975--SMSA level SUPFLG01 applies to all cells. Universe: persons 5 years and over. Living in an SMSA in 1980: Same SMSA in 1975: Central city of this SMSA Remainder of this SMSA Outside this SMSA in 1975: Different SMSA in 1975 Not in an SMSA in 1975 Not living in an SMSA in 1980: In an SMSA in 1975 Not in an SMSA in 1975
3328	3363	9 (4 cells)	N	TAB36	Place of work--state and county level SUPFLG01 applies to all cells. Universe: workers 16 years and over. See footnotes 16, 45. Worked in state of residence: Worked in county of residence Worked outside county of residence

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Record Position

First	Last	Length	Type	Name	Description
					Worked outside state of residence Not reported
3364	3399	9 (4 cells)	N	TAB37	Place of work--place level SUPFLG01 applies to all cells. Universe: workers 16 years and over. See footnotes 16, 17, 45, 48. Living in an identified place: Worked in place of residence Worked outside place of residence Not reported Not living in an identified place
3400	3444	9 (5 cells)	N	TAB38	Place of work--SMSA level SUPFLG01 applies to all cells. Universe: workers 16 years and over See footnotes 16 45 48 Living in an SMSA: Worked in SMSA of residence Central city of this SMSA Remainder of this SMSA Worked outside SMSA of residence Not reported Not living in an SMSA
3445	3471	9 (3 cells)	N	TAB39	Place of work--Minor civil division level SUPFLG01 applies to all cells. Universe: workers 16 years and over living in the 9 northeastern states. See footnotes 16, 45.

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Record Position

First	Last	Length	Type	Name	Description
					Worked in minor civil division of residence Worked outside minor civil division of residence Not reported
3472	3525	9 (6 cells)	N	TAB40	Means of transportation to work SUPFLG01 applies to all cells. Universe: Workers 16 years and over. See footnotes 18, 19, 45. Car, truck, or van: Drive alone Carpool Public transportation Walked only Other means Worked at home
3526	3597	9 (8 cells)	N	TAB41	Travel time to work SUPFLG01 applies to all cells. Universe: workers 16 years and over who did not work at home. See footnote 45. Less than 5 minutes 5 to 9 minutes 10 to 14 minutes 15 to 19 minutes 20 to 29 minutes 30 to 44 minutes 45 to 59 minutes 60 or more minutes

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Record Position

First	Last	Length	Type	Name	Description
3598	3612	15	N	TAB42	Aggregate travel time to work (in minutes) SUPFLG01 applies to all cells. Universe: workers 16 years and over who did not work at home. See footnote 12, 45. Aggregate travel time to work (in minutes)
3613	3657	9 (5 cells)	N	TAB43	Private vehicle occupancy SUPFLG01 applies to all cells. Universe: workers 16 years and over who travelled to work by car, truck, or van. See footnote 45. Drive alone In 2-person carpool In 3-person carpool In 4-person carpool In 5-or more person carpool
3658	3693	9 (4 cells)	N	TAB44	School enrollment SUPFLG01 applies to all cells. Universe: persons 3 years old and over enrolled in private school. Nursery school Kindergarten and elementary (1 to 8 years) High school (1 to 4 years) College
3694	3873	9 (20 cells)	N	TAB45	Race (5) by school enrollment (4) SUPFLG01 applies to cells 1-4. SUPFLG02 applies to cells 5-8.

Record Position

First	Last	Length	Type	Name	Description
					SUPFLG03 applies to cells 9-12. SUPFLG04 applies to cells 13-16. SUPFLG05 applies to cells 17-20. Universe: persons 3 years old and over enrolled in school. See footnote 4. The stratifiers are race by school enrollment: Total: Nursery school Kindergarten and elementary (1 to 8 years) High school (1 to 4 years) College White: Repeat school enrollment (4) Black: Repeat school enrollment (4) American Indian, Eskimo, and Aleut: Repeat school enrollment (4) Asian and Pacific Islander: Repeat school enrollment (4)
3874	3909	9 (4 cells)	N	TAB46	School enrollment SUPFLG06 applies to all cells. Universe: persons of Spanish origin 3 years old and over enrolled in school. Nursery school Kindergarten and elementary (1 to 8 years) High school (1 to 4 years) College
3910	3981	9 (8 cells)	N	TAB47	School enrollment, years of school completed and labor force status SUPFLG01 applies to all cells.

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Record Position

First	Last	Length	Type	Name	Description
					Universe: persons 16 to 19 years old. See footnote 45. Armed Forces Civilian: Enrolled in school Not enrolled in school: High school graduate: Employed Unemployed Not in labor force Not high school graduate: Employed Unemployed Not in labor force
3982	4032	51	A	FILL6	Filler
4033	4134	102	A	UIS2	Universal identifier section the characters in this field are identical to the first 102 characters of the record.
4135	4359	9 (25 cells)	N	TAB48	Race (5) by years of school completed (5) SUPFLG01 applies to cells 1-5. SUPFLG02 applies to cells 6-10. SUPFLG03 applies to cells 11-15. SUPFLG04 applies to cells 16-20. SUPFLG05 applies to cells 21-25. Universe: persons 25 years old and over. See footnote 4. The stratifiers are race by years of school completed Total: Elementary (0 to 8 years) High school: 1 to 3 years 4 years

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Record Position

First	Last	Length	Type	Name	Description
					College: 1 to 3 years 4 years White: Repeat years of school completed (5) Black: Repeat years of school completed (5) American Indian, Eskimo, and Aleut: Repeat years of school completed (5) Asian and Pacific Islander: Repeat years of school completed (5)
4360	4404	9 (5 cells)	N	TAB49	Years of school completed SUPFLG06 applies to all cells. Universe: persons of Spanish origin 25 years old and over. Elementary (0 to 8 years) High school: 1 to 3 years 4 years College: 1 to 3 years 4 or more years
4405	4449	9 (5 cells)	N	TAB50	Years of school completed SUPFLG01 applies to all cells. Universe: persons 18 years old and over. Elementary (0 to 8 years) through high school, 1 to 3 years High school, 4 years

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Record Position

First	Last	Length	Type	Name	Description
					College: 1 to 3 years 4 years 5 or more years
4450	4485	9 (4 cells)	N	TAB51	Sex (2) by veteran status (2) SUPFLC01 applies to all cells. Universe: civilian persons 16 years and over. The stratifiers are sex by veteran status Male: Veteran Nonveteran Female: Repeat veteran status (2)
4486	4539	9 (6 cells)	N	TAB52	Period of service SUPFLG01 applies to all cells. Universe: civilian veterans 16 years and over. See footnotes 20, 46. May 1975 or later only Vietnam era Korean conflict World War II World War I Other
4540	4575	9 (4 cells)	N	TAB53	Work disability status SUPFLG01 applies to all cells. Universe: noninstitutional persons 16 to 64 years. See footnotes 41, 45. With a work disability: In labor force

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Record Position

First	Last	Length	Type	Name	Description
					Not in labor force: Prevented from working Not prevented from working No work disability
4576	4611	9 (4 cells)	N	TAB54	Age (2) by public transportation disability status (2) SUPFLG01 applies to all cells. Universe: noninstitutional persons 16 years and over. See footnote 41. The stratifiers are age by public transportation disability status: 16 to 64 years: with a public transportation disability no public transportation disability 65 years and over: repeat public transportation disability status (2)
4612	4971	9 (40 cells)	N	TAB55	Race (5) by sex (2) by labor force status (4) SUPFLG01 applies to cells 1-8. SUPFLG02 applies to cells 9-16. SUPFLG03 applies to cells 17-24. SUPFLG04 applies to cells 25-32. SUPFLG05 applies to cells 33-40. Universe: persons 16 years and over. See footnotes 4, 45. The stratifiers are race by sex by labor force status:

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Record Position

First	Last	Length	Type	Name	Description
					Total: Male: Labor force: Armed forces Civilian labor force: Employed Unemployed Not in labor force Female: Repeat labor force status (4) White: Repeat sex by labor force status (8) Black: Repeat sex by labor force status (8) American Indian, Eskimo, and Aleut: Repeat sex by labor force status (8) Asian and Pacific Islander: Repeat sex by labor force status (8)
4972	5043	9 (8 cells)	N	TAB56	Sex (2) by labor force status (4) SUPFLG06 applies to all cells. Universe: persons of Spanish origin 16 years and over See footnote 45. The stratifiers are sex by labor force status Male: Labor force: Armed forces Civilian labor force: Employed Unemployed Not in labor force Female: Repeat labor force status (4)

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Record Position

First	Last	Length	Type	Name	Description
5044	5079	9 (4 cells)	N	TAB57	Presence and age of own children (2) by labor force status (2) SUPFLG01 applies to all cells. Universe: females 16 years and over with one or more own children See footnotes 10, 45, 51 The stratifiers are presence and age of own children by labor force status: With own children under 6 years: In labor force Not in labor force With own children 6 to 17 years only: Repeat labor force status (2)
5080	5151	9 (8 cells)	N	TAB58	Sex (2) by labor force status in 1979 (4) SUPFLG01 applies to all cells. Universe: persons 16 years and over. The stratifiers are sex by labor force status in 1979: Male: In labor force in 1979: Worked in 1979: With unemployment in 1979 No unemployment in 1979 Did not work in 1979, with unemployment in 1979 Not in labor force in 1979 Female: Repeat labor force status in 1979 (4)

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Record Position

First	Last	Length	Type	Name	Description
5152	5295	9 (16 cells)	N	TAB59	Sex (2) by usual hours worked per week in 1979 (2) by weeks worked in 1979 (4) SUPFLG01 applies to all cells. Universe: persons 16 years and over who worked in 1979. The stratifiers are sex by usual hours worked per week in 1979 by weeks worked in 1979: Male: Usually worked 35 or more hours per week: 50 to 52 weeks 40 to 49 weeks 27 to 39 weeks 1 to 26 weeks Usually worked 1 to 34 hours per week: Repeat weeks worked in 1979 (4) Female: Repeat usual hours worked per week in 1979 by weeks worked in 1979 (8)
5296	5325	15 (2 cells)	N	TAB60	Aggregate weeks worked in 1979 by sex SUPFLG01 applies to all cells. Universe: persons 16 years and over who worked in 1979. See footnote 12. Male Female
5326	5352	9 (3 cells)	N	TAB61	Weeks unemployed in 1979 SUPFLG01 applies to all cells.

Record Position

First	Last	Length	Type	Name	Description
					Universe: persons 16 years and over with unemployment in 1979. Unemployed 1 to 4 weeks Unemployed 5 to 14 weeks Unemployed 15 or more weeks
5353	5442	9 (10 cells)	N	TAB62	Race (5) by sex (2) SUPFLG01 applies to cells 1-2. SUPFLG02 applies to cells 3-4. SUPFLG03 applies to cells 5-6. SUPFLG04 applies to cells 7-8. SUPFLG05 applies to cells 9-10 Universe: Persons 16 years and over with unemployment in 1979. See footnote 4. The stratifiers are race by sex Total: Male Female White: Repeat sex (2) Black: Repeat sex (2) American Indian, Eskimo, and Aleut: Repeat sex (2) Asian and Pacific Islander: Repeat sex (2)
5443	5460	9 (2 cells)	N	TAB63	Sex SUPFLG06 applies to all cells. Universe: persons of Spanish origin 16 years and over with unemployment in 1979. Male Female

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Record Position

First	Last	Length	Type	Name	Description
5461	5490	15 (2 cells)	N	TAB64	Aggregate weeks unemployed in 1979 by sex SUPFLG01 applies to all cells. Universe: persons 16 years and over with unemployment in 1979. See footnote 12. Male Female
5491	5625	9 (15 cells)	N	TAB65	Industry SUPFLG01 applies to all cells. Universe: employed persons 16 years and over. See footnotes 42, 45, 53. Agriculture, forestry, fisheries, and mining (codes 10-50) Construction (code 60) Manufacturing: Nondurable goods (codes 100-222) Durable Goods (codes 230-392) Transportation (codes 400-432) Communications and other public utilities (codes 440-472) Wholesale trade (codes 500-571) Retail trade (codes 580-691) Financial, insurance, and real estate (codes 700-712) Business and repair services (codes 721-760) Personal, entertainment, and recreation services (codes 761-802)

Record Position

First	Last	Length	Type	Name	Description
					Professional and related services: Health services (codes 812-840) Educational services (codes 842-860) Other professional and related services (codes 841, 861-892) Public administration (codes 900-932)
5626	5742	9 (13 cells)	N	TAB66	Occupation SUPFLG01 applies to all cells. Universe: employed persons 16 years and over. See footnotes 43, 45, 53. Managerial and professional specialty occupations: Executive, administrative, and managerial occupations (codes 3-37) Professional specialty occupations (codes 43-199) Technical, sales, and administrative support occupations: Technicians and related support occupations (codes 203-235) Sales occupations (codes 243-285) Administrative support occupations, including clerical (codes 303-389)

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Record Position

First	Last	Length	Type	Name	Description
					Service occupations: Private household occupations (codes 403-407) Protective service occupations (codes 413-427) Service occupations, except protective and household (codes 433-469) Farming, forestry, and fishing occupations (codes 473-499) Precision production, craft, and repair occupations (codes 503-699) Operators, fabricators, and laborers: Machine operators, assemblers, and inspectors (codes 703-799) Transportation and material moving occupations (codes 803-859) Handlers, equipment cleaners, helpers, and laborers (codes 863-889)
5743	5796	9 (6 cells)	N	TAB67	Class of worker SUPFLG01 applies to all cells. Universe: employed persons 16 years and over. See footnote 45. Private wage and salary worker Federal government worker State government worker Local government worker Self-employed worker Unpaid family worker

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Record Position

First	Last	Length	Type	Name	Description
5797	5949	9 (17 cells)	N	TAB68	Household income in 1979 SUPFLG08 applies to all cells. Universe: households. Less than $2,500 $2,500 to $4,999 $5,000 to $7,499 $7,500 to $9,999 $10,000 to $12,499 $12,500 to $14,999 $15,000 to $17,499 $17,500 to $19,999 $20,000 to $22,499 $22,500 to $24,999 $25,000 to $27,499 $27,500 to $29,999 $30,000 to $34,999 $35,000 to $39,999 $40,000 to $49,999 $50,000 to $74,999 $75,000 or more
5950	5958	9	N	TAB69	Median household income in 1979 SUPFLG08 applies to all cells. Universe: households. Median household income in 1979
5959	5973	15	N	TAB70	Aggregate household income in 1979 SUPFLG08 applies to all cells. Universe: households. See footnote 12. Aggregate household income in 1979

Record Position					
First	**Last**	**Length**	**Type**	**Name**	**Description**
5974	6045	9 (8 cells)	N	TAB71	Income type in 1979 SUPFLG08 applies to all cells. Universe: households with income. See footnote 21. Earnings Wage or salary income Nonfarm self-employment income Farm self-employment income Interest, dividend, or net rental income Social security income Public assistance income All other income
6046	6048	3	A	FILL7	Filler
6049	6150	102	A	UIS3	Universal identifier section; the characters in this field are identical to the first 102 characters of the record.
6151	6255	15 (7 cells)	N	TAB72	Aggregate household income in 1979 by income type in 1979 SUPFLG08 applies to all cells. Universe: households with income. See footnotes 12, 21, 22. Earnings: Wage or salary income Nonfarm self-employment income Farm self-employment income Interest, dividend, or net rental income Social security income Public assistance income All other income

Record Position

First	Last	Length	Type	Name	Description
6256	6408	9 (17 cells)	N	TAB73	Family income in 1979 (17) SUPFLG08 applies to all cells. Universe: families Less than $2,500 $2,500 to $4,999 $5,000 to $7,499 $7,500 to $9,999 $10,000 to $12,499 $12,500 to $14,999 $15,000 to $17,499 $17,500 to $19,999 $20,000 to $22,499 $22,500 to $24,999 $25,000 to $27,499 $27,500 to $29,999 $30,000 to $34,999 $35,000 to $39,999 $40,000 to $49,999 $50,500 to $74,999 $75,000 or more
6409	6417	9	N	TAB74	Median family income in 1979 (1) SUPFLG08 applies to all cells. Universe: families Median household income in 1979
6418	6741	9 (36 cells)	N	TAB75	Race (4) by family income in 1979 (9) SUPFLG09 applies to cells 1-9 SUPFLG10 applies to cells 10-18 SUPFLG11 applies to cells 19-27 SUPFLG12 applies to cells 28-36 Universe: families with householder of specified races See footnotes 4, 11

Record Position

First	Last	Length	Type	Name	Description
					The stratifiers are race by family income: White: Less than 5,000 $5,000 to $7,499 $7,500 to $9,999 $10,000 to $14,999 $15,000 to $19,999 $20,000 to $24,999 $25,000 to $34,999 $35,000 to $49,999 $50,000 or more Black: Repeat family income in 1979 (9) American Indian, Eskimo, and Aleut: Repeat family income in 1979 (9) Asian and Pacific Islander: Repeat family income in 1979 (9)
6742	6822	9 (9 cells)	N	TAB76	Family income in 1979 SUPFLG14 applies to all cells. Universe: families with householder of Spanish origin. See footnote 11. Less than $5,000 $5,000 to $7,499 $7,500 to $9,999 $10,000 to $14,999 $15,000 to $19,999 $20,000 to $24,999 $25,000 to $34,999 $35,000 to $49,999 $50,000 or more

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Record Position

First	Last	Length	Type	Name	Description
6823	6897	15 (5 cells)	N	TAB77	Aggregate family income in 1979 by race of householder SUPFLG08 applies to cell 1. SUPFLG09 applies to cell 2. SUPFLG10 applies to cell 3. SUPFLG11 applies to cell 4. SUPFLG12 applies to cell 5. Universe: families. See footnotes 4, 11, 12. Total White Black American, Indian, Eskimo, and Aleut Asian and Pacific Islander
6898	6912	15	N	TAB78	Aggregate family income in 1979 SUPFLG14 applies to all cells. Universe: families with householder of Spanish origin. See footnotes 11, 12. Aggregate family income in 1979
6913	6939	9 (3 cells)	N	TAB79	Workers in family in 1979 SUPFLG08 applies to all cells. Universe: families. No workers 1 worker 2 or more workers
6940	6984	15 (3 cells)	N	TAB80	Aggregate family income in 1979 by workers in family in 1979 SUPFLG08 applies to all cells. Universe: families. See footnote 12.

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Record Position

First	Last	Length	Type	Name	Description
					No workers 1 worker 2 or more workers
6985	7119	9 (15 cells)	N	TAB81	Income in 1979 SUPFLG01 applies to all cells. Universe: unrelated individuals 15 years and over. See footnote 54. Less than $1,000 $1,000 to $1,999 $2,000 to $2,999 $3,000 to $3,999 $4,000 to $4,999 $5,000 to $5,999 $6,000 to $6,999 $7,000 to $7,999 $8,000 to $8,999 $9,000 to $9,999 $10,000 to $11,999 $12,000 to $14,999 $15,000 to $24,999 $25,000 to $49,999 $50,000 or more
7120	7128	9	N	TAB82	Median income in 1979 SUPFLG01 applies to all cells. Universe: unrelated individuals 15 years and over. See footnote 54. Median income in 1979
7129	7143	15	N	TAB83	Aggregate income in 1979 SUPFLG01 applies to all cells. Universe: unrelated individuals 15 years and over. See footnotes 12, 54.

Record Position

First	Last	Length	Type	Name	Description
					Aggregate income in 1979
7144	7173	15 (2 cells)	N	TAB84	Aggregate income in 1979 by inmate status SUPFLG01 applies to all cells. Universe: persons 15 years and over. See footnotes 12, 41. Total Noninstitutional
7174	7191	9 (2 cells)	N	TAB85	Per capita income in 1979 by inmate status SUPFLG01 applies to all cells. Universe: Persons. See footnotes 41, 44. Total Noninstitutional
7192	7335	9 (16 cells)	N	TAB86	Family type (2) by poverty status in 1979 (2) by presence and age of related children (4) SUPFLG08 applies to all cells. Universe: families. See footnote 10. The stratifiers are family type by poverty status in 1979 by presence and age of related children: Total: Income in 1979 above poverty level:

Record Position

First	Last	Length	Type	Name	Description
					with related children: under 6 years and 6 to 17 years under 6 years only 6 to 17 years only without related children Income in 1979 below poverty level: repeat presence and age of related children (4) Family with female householder, no husband present: Repeat poverty status in 1979 by presence and age of related children (8)
7336	7389	9 (6 cells)	N	TAB87	Poverty status in 1979 (2) by presence and age of related children (3) SUPFLG08 applies to all cells. Universe: families with one or more related children. See footnote 10. The stratifiers are poverty status in 1979 by presence and age of related children: Income in 1979 above poverty level: with related children under 5 years and 5 to 17 years with related children under 5 years only with related children 5 to 17 years only Income in 1979 below poverty level: repeat presence and age of related children (3)

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Record Position

First	Last	Length	Type	Name	Description
7390	7443	9 (6 cells)	N	TAB88	Poverty status in 1979 (3) by age of householder (2) SUPFLG08 applies to all cells. Universe: families. The stratifiers are poverty status in 1979 by age of householder: Income in 1979 below poverty level: Householder 15 to 64 years Householder 65 years and over. Income in 1979 between 100 and 124 percent of poverty level: repeat age of householder (2) Income in 1979 125 percent of poverty level and above: repeat age of householder (2)
7444	7497	9 (6 cells)	N	TAB89	Poverty status in 1979 (3) by age of householder (2) SUPFLG01 applies to all cells. Universe: nonfamily householders. The stratifiers are poverty status in 1979 by age of householder: Income in 1979 below poverty level: Householder 15 to 64 years Householder 65 years and over. Income in 1979 between 100 and 124 percent of poverty level: repeat age of householder (2) Income in 1979 125 percent of poverty level and above: repeat age of householder (2)

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Record Position

First	Last	Length	Type	Name	Description
7498	7533	9 (4 cells)	N	TAB90	Poverty status in 1979 (2) by age (2) SUPFLG01 applies to all cells. Universe: unrelated individuals for whom poverty status is determined. See footnotes 23, 54. The stratifiers are poverty status in 1979 by age: Income in 1979 above poverty level: 15 to 64 years 65 years and over. Income in 1979 below poverty level: repeat age (2)
7534	7623	9 (10 cells)	N	TAB91	Race (5) by poverty status in 1979 (2) SUPFLG01 applies to cells 1-2. SUPFLG02 applies to cells 3-4. SUPFLG03 applies to cells 5-6. SUPFLG04 applies to cells 7-8. SUPFLG05 applies to cells 9-10. Universe: persons for whom poverty status is determined. See footnotes 4, 23. The stratifiers are race by poverty status in 1979: Total: Income in 1979 above poverty level Income in 1979 below poverty level

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Record Position

First	Last	Length	Type	Name	Description
					White: Repeat poverty status in 1979 (2) Black: Repeat poverty status in 1979 (2) American Indian, Eskimo, and Aleut: Repeat poverty status in 1979 (2) Asian and Pacific Islander: Repeat poverty status in 1979 (2)
7624	7641	9 (2 cells)	N	TAB92	Poverty status in 1979 SUPFLG06 applies to all cells. Universe: persons of Spanish origin for whom poverty status is determined. See footnote 23. Income in 1979 above poverty level Income in 1979 below poverty level
7642	7713	9 (8 cells)	N	TAB93	Poverty status in 1979 (2) by age (4) SUPFLG01 applies to all cells. Universe: persons for whom poverty status is determined. See footnote 23. The stratifiers are poverty status in 1979 by age:

Record Position

First	Last	Length	Type	Name	Description
					Income in 1979 above poverty level: Under 55 years 55 to 59 years 60 to 64 years 65 years and over. Income in 1979 below poverty level: Repeat age (4)
7714	7785	9 (8 cells)	N	TAB94	Poverty status in 1979 (2) by household relationship and age (4) SUPFLG01 applies to all cells. Universe: persons in families, excluding householders. See footnote 10. The stratifiers are poverty status in 1979 by household relationship and age: Income in 1979 above poverty level: Related child under 5 years Related child 5 years Related child 6 to 17 years Other family member Income in 1979 below poverty level: Repeat household relationship and age (4)
7786	7830	9 (5 cells)	N	TAB95	Poverty status in 1979 SUPFLG01 applies to all cells. Universe: persons for whom poverty status is determined. See footnote 23.

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Record Position

First	Last	Length	Type	Name	Description
					Income in 1979 below 75 percent of poverty level Income in 1979 between 75 and 124 percent of poverty level Income in 1979 between 125 and 149 percent of poverty level Income in 1979 between 150 and 199 percent of poverty level Income in 1979 200 percent of poverty level and above
7831	7866	9 (4 cells)	N	TAB96	Vacancy status This table has no suppression Universe: vacant housing units See footnote 24. For sale only For rent Held for occasional use Other vacants
7867	7884	9 (2 cells)	N	TAB97	Tenure SUPFLG08 applies to cell 2 Universe: occupied housing units. Total Renter occupied
7885	7974	9 (10 cells)	N	TAB98	Tenure (2) by race of householder (5) SUPFLG09 applies to cell 6. SUPFLG10 applies to cell 7. SUPFLG11 applies to cell 8. SUPFLG12 applies to cell 9. SUPFLG13 applies to cell 10. Universe: occupied housing units. See footnotes 4, 5, 11.

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Record Position

First	Last	Length	Type	Name	Description
					The stratifiers are tenure by race of householder: Total: White Black American Indian, Eskimo, and Aleut Asian and Pacific Islander Other (Race, N.E.C.) Renter occupied: Repeat race of householder (5)
7975	7992	9 (2 cells)	N	TAB99	Tenure SUPFLG14 applies to cell 2. Universe: occupied housing units with householder of Spanish origin. See footnote 11. Total Renter occupied
7993	8022	15 (2 cells)	N	TAB100	Tenure SUPFLG01 applies to all cells. Universe: persons in occupied housing units. See footnote 12. Total Renter occupied
8023	8037	15	N	TAB101	Aggregate rooms SUPFLG07 applies to all cells. Universe: year-round housing units. See footnote 12. Aggregate rooms

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Record Position

First	Last	Length	Type	Name	Description
8038	8064	27	A	FILL8	Filler
8065	8166	102	A	UIS4	Universal identifier section; the characters in this field are identical to the first 102 characters of the record.
8167	8328	9 (18 cells)	N	TAB102	Tenure and occupancy status (3) by units in structure (6) SUPFLG07 applies to cells 1-6. SUPFLG08 applies to cells 7-12. SUPFLG27 applies to cells 13-18. Universe: year-round housing units. See footnote 25. The stratifiers are tenure and occupancy status by units in structure: Total 1, detached 1, attached 2 3 and 4 5 or more Mobile home or trailer, etc. Total Occupied: Repeat units in structure (6) Renter occupied: Repeat units in structure (6)
8329	8382	9 (6 cells)	N	TAB103	Units in structure This table has no suppression. Universe: vacant seasonal and migratory housing units. See footnote 1.

Record Position

First	Last	Length	Type	Name	Description
					1, detached 1, attached 2 3 and 4 5 or more Mobile home or trailer
8383	8562	15 (12 cells)	N	TAB104	Tenure (2) by units in structure (6) SUPFLG01 applies to all cells. Universe: persons in occupied housing units. See footnotes 12, 25. The stratifiers are tenure by units in structure: Total 1, detached 1, attached 2 3 and 4 5 or more Mobile home or trailer, etc. Renter occupied: Repeat units in structure (6)
8563	8598	9 (4 cells)	N	TAB105	Stories in structure SUPFLG07 applies to all cells. Universe: year-round housing units. 1 to 3 4 to 6 7 to 12 13 or more
8599	8616	9 (2 cells)	N	TAB106	Passenger elevator SUPFLG07 applies to all cells.

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Record Position

First	Last	Length	Type	Name	Description
					Universe: year-round housing units in structure with 4 or more stories with elevator no elevator
8617	8652	9 (4 cells)	N	TAB107	Source of water SUPFLG07 applies to all cells. Universe: year-round housing units. Public system or private company individual well: drilled dug Some other source
8653	8679	9 (3 cells)	N	TAB108	Sewage disposal SUPFLG07 applies to all cells. Universe: year-round housing units. Public sewer Septic tank or cesspool Other means
8680	8868	9 (21 cells)	N	TAB109	Tenure and occupancy status (3) by year structure built (7) SUPFLG07 applies to cell 1-7. SUPFLG08 applies to cell 8-14. SUPFLG27 applies to cell 15-21. Universe: year-round housing units. The stratifiers are tenure and occupancy status by year structure built:

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Record Position

First	Last	Length	Type	Name	Description
					Total: 1979 to March 1980 1975 to 1978 1970 to 1974 1960 to 1969 1950 to 1959 1940 to 1949 3939 or earlier Total occupied: Repeat year structure built (7) Renter occupied: Repeat year structure built (7)
8869	8976	9 (12 cells)	N	TAB110	Tenure (2) by year householder moved into unit (6) SUPFLG08 applies to cells 1-6. SUPFLG27 applies to cells 7-12. Universe: occupied housing units. The stratifiers are tenure by year householder moved into unit: Total: 1979 to March 1980 1975 to 1978 1970 to 1974 1960 to 1969 1950 to 1959 1949 or earlier Renter occupied: Repeat year householder moved into unit (6)
8977	9057	9 (9 cells)	N	TAB111	Heating equipment SUPFLG07 applies to all cells. Universe: year-round housing units.

Record Position

First	Last	Length	Type	Name	Description
					Steam or hot water system Central warm-air furnace Electric heat pump Other built-in electric units Floor, wall, or pipeless furnace Room heaters with flue Room heaters without flue Fireplaces, stoves, or portable room heaters None
9058	9129	9 (8 cells)	N	TAB112	House heating fuel SUPFLG08 applies to all cells. Universe: occupied housing units See footnote 26. Utility gas Bottled, tank, or LP gas Electricity Fuel oil, kerosene, etc. Coal or coke Wood Other fuel No fuel used
9130	9174	9 (5 cells)	N	TAB113	Cooking fuel SUPFLG08 applies to all cells. Universe: occupied housing units. See footnotes 26, 27. Utility gas Bottled, tank, or LP gas Electricity Other No fuel used

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Record Position					
First	Last	Length	Type	Name	Description
9175	9228	9 (6 cells)	N	TAB114	Water heating fuel SUPFLG08 applies to all cells. Universe: occupied housing units. See footnotes 26, 27. Utility gas Bottled, tank, or LP gas Electricity Fuel oil, kerosene, etc. Other No fuel used
9229	9246	9 (2 cells)	N	TAB115	Kitchen facilities SUPFLG07 applies to all cells. Universe: year-round housing units. Complete kitchen facilities No complete kitchen facilities
9247	9408	9 (18 cells)	N	TAB116	Tenure and occupancy status (3) by bedrooms (6) SUPFLG07 applies to cells 1-6. SUPFLG08 applies to cells 7-12. SUPFLG27 applies to cells 13-18. Universe: year-round housing units. The stratifiers are tenure and occupancy status by bedrooms: Total: None 1 2 3 4 5 or more

Record Position

First	Last	Length	Type	Name	Description
					Total occupied: Repeat bedrooms (6) Renter occupied: Repeat bedrooms (6)
9409	9516	9 (12 cells)	N	TAB117	Tenure and occupancy status (3) by bathrooms (4) SUPFLG07 applies to cells 1-4. SUPFLG08 applies to cells 5-8. SUPFLG27 applies to cells 9-12. Universe: year-round housing units. The stratifiers are tenure and occupancy status by bathrooms: Total: No bathroom or only a half bath 1 complete bathroom 1 complete bathroom plus half bath(s) 2 or more complete bathrooms Total occupied: Repeat bathrooms (4) Renter occupied: Repeat bathrooms (4)
9517	9552	9 (4 cells)	N	TAB118	Tenure (2) by telephone in housing unit (2) SUPFLG08 applies to cells 1-2. SUPFLG27 applies to cells 3-4. Universe: occupied housing units. The stratifiers are tenure by telephone in housing unit: Total: with telephone no telephone

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Record Position

First	Last	Length	Type	Name	Description
					Renter occupied: Repeat telephone in housing unit (2)
9553	9588	9 (4 cells)	N	TAB119	Age of householder (2) by telephone in housing unit (2) SUPFLG08 applies to all cells. Universe: occupied housing units with householders of selected age groups. The stratifiers are age of householder by telephone in housing unit: Householder 60 to 64 years: With telephone No telephone Householder 65 years and over: Repeat telephone in housing unit (2)
9589	9624	9 (4 cells)	N	TAB120	Air conditioning SUPFLG07 applies to all cells. Universe: year-round housing units. None Central system 1 individual room unit 2 or more individual room units.
9625	9669	9 (5 cells)	N	TAB121	Race of householder SUPFLG08 applies to cell 1. SUPFLG09 applies to cell 2. SUPFLG10 applies to cell 3. SUPFLG11 applies to cell 4. SUPFLG12 applies to cell 5.

Record Position

First	Last	Length	Type	Name	Description
					Universe: occupied housing units with no vehicle available. See footnotes 4, 11, 28. Total White Black American Indian, Eskimo, and Aleut Asian and Pacific Islander
9670	9678	9	N	TAB122	Occupied housing units with householder of Spanish origin with no vehicle available SUPFLG14 applies to all cells. Universe: occupied housing units with householder of Spanish origin with no vehicle available. See footnotes 11, 28. Occupied housing units with householder of Spanish origin with no vehicle available
9679	9705	9 (3 cells)	N	TAB123	Vehicles available SUPFLG08 applies to all cells. Universe: occupied housing units with vehicle available. See footnote 28. 1 2 3 or more
9706	9831	9 (14 cells)	N	TAB124	Gross rent SUPFLG21 applies to all cells.

Record Position

First	Last	Length	Type	Name	Description
					Universe: specified renter-occupied housing units. See footnote 29. Less than $60 $60 to $79 $80 to $99 $100 to $119 $120 to $149 $150 to $169 $170 to $199 $200 to $249 $250 to $299 $300 to $349 $350 to $399 $400 to $499 $500 or more No cash rent
9832	10011	9 (20 cells)	N	TAB125	Race of householder (4) by gross rent (5) SUPFLG22 applies to cells 1-5. SUPFLG23 applies to cells 6-10. SUPFLG24 applies to cells 11-15. SUPFLG25 applies to cells 16-20. Universe: specified renter-occupied housing units with householder of specified races. See footnotes 4, 11, 29. The stratifiers are race of householder by gross rent: White: Less than $100 $100 to $199 $200 to $299 $300 or more No cash rent

Record Position

First	Last	Length	Type	Name	Description
					Black: Repeat gross rent (5) American Indian, Eskimo, and Aleut: Repeat gross rent (5) Asian and Pacific Islander: Repeat gross rent (5)
10012	10056	9 (5 cells)	N	TAB126	Gross rent SUPFLG26 applies to all cells. Universe: specified renter-occupied housing units with householder of Spanish origin. See footnotes 11, 29. Less than $100 $100 to $199 $200 to $299 $300 or more No cash rent
10057	10065	9	N	TAB127	Median gross rent SUPFLG21 applies to all cells. Universe: specified renter-occupied housing units paying cash rent. See footnote 29. Median gross rent
10066	10080	15	N	TAB128	Aggregate gross rent SUPFLG21 applies to all cells. Universe: specified renter-occupied housing units paying cash rent. See footnotes 12, 29. Aggregate gross rent

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10081	10182	102	A	UIS5	Universal identifier section; the characters in this field are identical to the first 102 characters of the record.
10183	10212	15 (2 cells)	N	TAB129	Aggregate contract rent and rent asked by occupancy status SUPFLG21 applies to all cells. Universe: specified renter-occupied paying cash rent and vacant-for-rent housing units. See footnotes 12, 29. Renter occupied Vacant for rent
10213	10230	9 (2 cells)	N	TAB130	Occupancy status SUPFLG21 applies to all cells. Universe: specified renter-occupied paying cash rent and vacant-for-rent housing units. See footnote 29. Renter occupied Vacant for rent
10231	10248	9 (2 cells)	N	TAB131	Inclusion of utilities in rent SUPFLG21 applies to all cells. Universe: specified renter-occupied housing units. See footnotes 29, 30. Pay extra for 1 or more utilities No extra payment for any utilities

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Record Position

First	Last	Length	Type	Name	Description
10249	10473	9 (25 cells)	N	TAB132	Household income in 1979 (5) by gross rent as percentage of income (5) SUPFLG21 applies to all cells. Universe: specified renter-occupied housing units. See footnotes 29, 31. The stratifiers are household income in 1979 by gross rent as percentage of income Less than 5,000: Less than 20 percent 20 to 24 percent 25 to 34 percent 35 percent or more not computed $5,000 to $9,999: Repeat gross rent as percentage of income (5) $10,000 to $14,999: Repeat gross rent as percentage of income (5) $15,000 to $19,999: Repeat gross rent as percentage of income (5) $20,000 or more: Repeat gross rent as percentage of income (5)
10474	10653	9 (20 cells)	N	TAB133	Mortgage status and selected monthly owner costs SUPFLG15 applies to all cells. Universe: specified owner-occupied noncondominium housing units. See footnotes 32, 33.

Record Position

First	Last	Length	Type	Name	Description
					With a mortgage: Less than $100 $100 to $149 $150 to $199 $200 to $249 $250 to $299 $300 to $349 $350 to $399 $400 to $449 $450 to $499 $500 to $599 $600 to $749 $750 or more Not mortgaged: Less than $50 $50 to $74 $75 to $99 $100 to $124 $125 to $149 $150 to $199 $200 to $249 $250 or more
10654	10671	9 (2 cells)	N	TAB134	Median selected monthly owner costs by mortgage status SUPFLG15 applies to all cells. Universe: specified owner-occupied noncondominium housing units. See footnotes 32, 33. With a mortgage Not mortgaged
10672	10887	9 (24 cells)	N	TAB135	Race of householder (4) by mortgage status and selected monthly owner costs (6)

Record Position

First	Last	Length	Type	Name	Description
					SUPFLG16 applies to cells 1-6. SUPFLG17 applies to cells 7-12. SUPFLG18 applies to cells 13-18. SUPFLG19 applies to cells 19-24. Universe: specified owner-occupied noncondominium housing units with householder of specified races. See footnotes 4, 11, 32, 33. The stratifiers are race of householder by mortgage status and selected monthly owner costs: White: With a mortgage: Less than $200 $200 to $299 $300 to $399 $400 to $499 $500 or more Not mortgaged Black: Repeat mortgage status and selected monthly owner costs (6) American Indian, Eskimo, and Aleut: Repeat mortgage status and selected monthly owner costs (6) Asian and Pacific Islander: Repeat mortgage status and selected monthly owner costs (6)
10888	10941	9 (6 cells)	N	TAB136	Mortgage status and selected monthly owner costs SUPFLG20 applies to all cells.

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Record Position

First	Last	Length	Type	Name	Description
					Universe: specified owner-occupied noncondominium housing units with householder of Spanish origin See footnotes 11, 32, 33. With a mortgage: Less than $200 $200 to $299 $300 to $399 $400 to $499 $500 or more Not mortgaged
10942	11016	15 (5 cells)	N	TAB137	Aggregate selected monthly owner costs by mortgage status and year householder moved into unit SUPFLG15 applies to all cells. Universe: specified owner-occupied noncondominium housing units. See footnotes 12, 32, 33. With a mortgage: 1975 to March 1980 1970 to 1974 1960 to 1969 1959 or earlier Not mortgaged
11017	11061	9 (5 cells)	N	TAB138	Mortgage status and year householder moved into unit SUPFLG15 applies to all cells. Universe: specified owner-occupied noncondominium housing units. See footnote 33.

Record Position

First	Last	Length	Type	Name	Description
					With a mortgage: 1975 to March 1980 1970 to 1974 1960 to 1969 1959 or earlier Not mortgaged
11062	11286	9 (25 cells)	N	TAB139	Household income in 1979 (5) by selected monthly owner costs as percentage of income (5) SUPFLG15 applies to all cells. Universe: specified owner-occupied noncondominium housing units. See footnotes 32, 33, 34. The stratifiers are household income in 1979 by selected monthly owner costs as percentage of income: Less than $5,000: Less than 20 percent 20 to 24 percent 25 to 34 percent 35 percent or more Not computed $5,000 to $9,999: Repeat selected monthly owner costs as percentage of income (5) $10,000 to $14,999: Repeat selected monthly owner costs as percentage of income (5) $15,000 to $19,999: Repeat selected monthly owner costs as percentage of income (5) $20,000 or more:

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Record Position

First	Last	Length	Type	Name	Description
					Repeat selected monthly owner costs as percentage of income (5)
11287	11301	15	N	TAB140	Aggregate value SUPFLG15 applies to all cells. Universe: specified owner-occupied noncondominium housing units. See footnotes 12, 33, 35. Aggregate value
11302	11331	15 (2 cells)	N	TAB141	Aggregate household income in 1979 by tenure SUPFLG08 applies to cell 1. SUPFLG27 applies to cell 2. Universe: occupied housing units. See footnote 12 Total Renter occupied
11332	11403	9 (8 cells)	N	TAB142	Heating equipment (2) by year structure built (2) by persons per room (2) SUPFLG08 applies to all cells. Universe: occupied housing units with complete plumbing facilities for exclusive use. See footnotes 36, 37. The stratifiers are heating equipment by year structure built by persons per room:

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Record Position

First	Last	Length	Type	Name	Description
					With central heating system: 1939 or earlier: Less than 1.01 persons per room 1.01 or more persons per room 1940 to March 1980: Repeat persons per room (2) Lacking central heating system: Repeat year structure built by persons per room (4)
11404	11448	9 (5 cells)	N	TAB143	Race of householder SUPFLG08 applies to cell 1. SUPFLG09 applies to cell 2. SUPFLG10 applies to cell 3. SUPFLG11 applies to cell 4. SUPFLG12 applies to cell 5. Universe: occupied housing units with complete plumbing facilities for exclusive use. See footnotes 4, 11, 37. Total White Black American Indian, Eskimo, and Aleut Asian and Pacific Islander
11449	11457	9	N	TAB144	Occupied housing units with householder of Spanish origin with complete plumbing facilities for exclusive use SUPFLG14 applies to all cells. Universe: occupied housing units with householder of Spanish origin with complete plumbing facilities for exclusive use See footnotes 11, 37.

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Record Position

First	Last	Length	Type	Name	Description
					Occupied housing units with householder of Spanish origin with complete plumbing facilities for exclusive use.
11458	11502	9 (5 cells)	N	TAB145	Race of householder SUPFLG08 applies to cell 1. SUPFLG09 applies to cell 2. SUPFLG10 applies to cell 3. SUPFLG11 applies to cell 4. SUPFLG12 applies to cell 5. Universe: occupied housing units with complete plumbing facilities for exclusive use and year structure built 1939 or earlier. See footnotes 4, 11, 37. Total White Black American Indian, Eskimo, and Aleut Asian and Pacific Islander
11503	11511	9	N	TAB146	Occupied housing units with householder of Spanish origin with complete plumbing facilities for exclusive use and year structure built 1939 or earlier SUPFLG14 applies to all cells. Universe: occupied housing units with householder of Spanish origin with complete plumbing facilities for exclusive use and year structure built 1939 or earlier. See footnotes 11, 37.

Record Position

First	Last	Length	Type	Name	Description
					Occupied housing units with householder of Spanish origin with complete plumbing facilities for exclusive use and year structure built 1939 or earlier
11512	11556	9 (5 cells)	N	TAB147	Race of householder SUPFLG08 applies to cell 1. SUPFLG09 applies to cell 2. SUPFLG10 applies to cell 3. SUPFLG11 applies to cell 4. SUPFLG12 applies to cell 5. Universe: occupied housing units with complete plumbing facilities for exclusive use and with 1.01 persons per room or more. See footnotes 4, 11, 37. Total White Black American Indian, Eskimo, and Aleut Asian and Pacific Islander
11557	11565	9	N	TAB148	Occupied housing units with householder of Spanish origin with complete plumbing facilities for exclusive use and with 1.01 persons per room or more SUPFLG14 applies to all cells. Universe: occupied housing units with householder of Spanish origin with complete plumbing facilities for exclusive use and with 1.01 persons per room or more. See footnotes 11, 37.

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RECORD NAME/DESCRIPTION: Record 01
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Record Position

First	Last	Length	Type	Name	Description
					Occupied housing units with householder of Spanish origin with complete plumbing facilities for exclusive use and with 1.01 persons per room or more
11566	11610	9 (5 cells)	N	TAB149	Race of householder SUPFLG08 applies to cell 1. SUPFLG09 applies to cell 2. SUPFLG10 applies to cell 3. SUPFLG11 applies to cell 4. SUPFLG12 applies to cell 5. Universe: occupied housing units with complete plumbing facilities for exclusive use and lacking central heating equipment. See footnotes 4, 11, 36, 37. Total White Black American Indian, Eskimo, and Aleut Asian and Pacific Islander
11611	11619	9	N	TAB150	Occupied housing units with householder of Spanish origin with complete plumbing facilities for exclusive use and lacking central heating equipment SUPFLG14 applies to all cells. Universe: occupied housing units with householder of Spanish origin with complete plumbing facilities for exclusive use and lacking central heating equipment.

FILE NAME: STF3A[4]

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Record Position

First	Last	Length	Type	Name	Description
					See footnotes 11, 36, 37. Occupied housing units with householder of Spanish origin with complete plumbing facilities for exclusive use and lacking central heating equipment
11620	12096	477	A	FILL9	Filler

STF3A Footnote Section[4]

01 Vacant seasonal/migratory units are excluded from all matrices except as noted specifically in the documentation

02 The farm population is defined as persons living in rural territory on places from which $1,000 or more of farm products were sold in 1979. In 1970, the definition included all rural places with sales of $250 or more, plus rural places of 10 or more acres with sales of $50 to $249.

03 The count of households in sample tabulations may differ from the number of occupied housing units. This is a result of the weighting process used to minimize differences between complete counts and sample estimates. An indication of the type of weight (population or housing) for each matrix is listed in footnote 50.

04 "Asian and Pacific Islander", in the 100 percent tabulations, includes "Japanese", "Chinese", "Filipino", "Korean", "Asian Indian", "Vietnamese", Hawaiian", "Guamanian", and "Samoan". "Asian and Pacific Islander", in sample tabulations, includes the groups listed above and those persons who have a write-in entry of an Asian or Pacific Islander group in the "other" category.

05 For data tabulated on a 100 percent basis, includes all persons in the category "other". For data tabulated from the sample, excludes those persons who have a write-in entry of an Asian and Pacific Islander group in the "other" category.

06 This category refers to write-in entries of Spanish groups in the race question. Such entries are not necessarily consistent with responses in the Spanish origin question.

07 Tabulations of "persons in household" based on 100 percent data by definition are the same as tabulations of "persons in unit". The phrase "persons in household" is used unless the matrix is stratified by a housing item such as tenure, plumbing facilities, etc., in which case, the phrase "persons in unit" is used. Tabulations of "persons in household" and "persons in unit" based on sample data are not necessarily the same because of differences in the procedures used to inflate sample population and housing data.

08 Relatives include householder, spouse, and the questionnaire categories: "son/daughter", "brother/sister", "father/mother", and "other relative". Tabulations of "other relatives" include all categories not shown separately in the matrix.

09 "Nonrelatives" include the questionnaire categories: "roomer, boarder", "partner, roommate", "paid employee", and "other nonrelatives". Tabulations of "nonrelatives" include all categories not shown separately in the matrix.

10 A "child of householder" includes any son, daughter, stepchild, or adopted child of the householder. An "own child of householder" is a never married child under 18 years of age who is a son, daughter, stepchild, or adopted child of the householder. "Related children" include not only own children but also all other family members, regardless of marital status, who are under 18 years old, except the householder or spouse. Foster children are included in the "nonrelative" category.

In subfamilies an "own child" is a never-married child under 18 years of age who is a son, daughter, stepchild, or adopted child of a mother in a mother-child subfamily, a father in a father-child subfamily or either spouse in a married-couple subfamily.

11 Tabulations for households and families are classified by the race and Spanish origin of the householder.

12 This aggregate, along with the relevant count, will permit the computation of a mean. For example, the aggregate value for specified owner-occupied noncondominium units will yield the mean value when divided by the count of specified owner-occupied noncondominium units, and the aggregate rooms for occupied and vacant year-round units divided by the count of occupied and vacant year-round units yields mean rooms. (See footnote 35 prior to computing mean value or price asked.)

13 Includes responses indicating religious groups and unclassifiable responses.

14 Persons may be counted more than once in this tabulation.

15 "Ever married" includes the questionnaire categories: "now married", "separated", "widowed", and "divorced".

16 "Not reported" means place of work was not reported at all or was not reported at least to the county level. One exception to this is in the treatment of New York City, where a response of "New York City" without reporting county (Borough) is treated as reported. In tabulations, "reported" cases that are not reported to the area required for a specific tabulation are treated as reported but as working outside of that area. For example, for place-of-work tabulations at the place level, in a case where the place of work was reported only to the state and county levels, the response is tallied as working outside of the place.

17 An identified place is a place, with a population of 2,500 or more (1,000 or more in Alaska and Hawaii) generally based on 1977 population estimates, that was recognized in precensus geography. In mail enumeration acres, identified places were those recognized as of January 1, 1978; in conventional enumeration areas, identified places were those recognized as of January 1, 1979. Population estimates for identified places which incorporated after 1977 are based on the best available information.

18 "Public transportation" includes "bus or streetcar", "railroad", "subway or elevated", and "taxicab".

19 "Means of transportation to work" include "car", "truck", "van", "bus or streetcar", "railroad", "subway or elevated", "taxicab" "motorcycle", "bicycle", "walked only", "worked at home", and "other". Tabulations of "other means" include all categories not shown separately in the matrix or not specified as "public transportation". (See footnote 18.)

20 Veterans are classified by the most recent period of service, excluding peace time service.

21 Households may be counted more than once in this tabulation.

22 In this matrix, the aggregate income figures refer to the amount of income for each specific type separately (e.g., the first aggregate shows the total amount of wage or salary income received by households in 1979).

23 Tabulations of poverty status exclude inmates of institutions, persons in military group quarters and in college dormitories and unrelated individuals under 15 years. (See footnote 54.)

24 Vacant housing units include the questionnaire categories: "for rent", "for sale only", "rented or sold, not occupied", "held for occasional use", and "other vacant". Tabulations of "other vacants" include all categories not shown separately in the matrix.

25 "Units in structure" includes "a mobile home or trailer", "a one-family house detached from any other house", "a one-family house attached to one or more houses", "a building for two families", "a building for three or four families", a building for five to nine families", a building for ten to nineteen families", a building for twenty to forty-nine families", a building for fifty or more families", "a boat, tent, van, etc". Tabulations of "mobile home or trailer, etc." include "a mobile home or trailer", and "a boat, tent, van, etc.".

26 "Utility gas" includes "gas: from underground pipes serving the neighborhood".

27 Fuels include "utility gas" (see footnote 26), "bottled, tank or lp gas", "electricity", "fuel oil, kerosene, etc.", "coal or coke", "wood", "other fuel", and "no fuel used". Tabulations of "other" include all categories not shown separately in the matrix.

28 "Vehicles" includes automobiles, trucks, and vans.

29 Gross rent and contract rent are tabulated for all "renter-occupied" units except one-family homes on a property of 10 or more acres. Units tabulated in the "no cash rent" category also exclude one-family homes on 10 or more acres. A unit classified as "no cash rent" in contract rent will remain no cash rent in the gross rent distribution even if the unit's occupants pay for utilities themselves. Gross rent is the sum of contract rent and utility costs. Rent asked is tabulated for "vacant-for-rent" units except one-family homes on 10 or more acres.

30 "Utilities" include "electricity", "gas", "water", and "oil, coal, kerosene, wood, etc".

31 Includes households with zero or negative income and units tabulated in the "no cash rent" category.

32 "Selected monthly owner costs" is the sum of payments for real estate taxes, property insurance, utilities (see footnote 30), and regular mortgage payments.

33 Value and price asked are tabulated separately for noncondominium and condominium units.

The noncondominium value distribution is restricted to certain kinds of "owner-occupied" units; the noncondominium price asked distribution is restricted to certain kinds of "vacant-for-sale-only" units. The noncondominium selected monthly owner costs distribution is restricted to certain kinds of owner-occupied units. the following are excluded from the tabulations on value, price asked, and selected monthly owner costs for noncondominium units:

A. Units at an address with two or more units
B. Units on 10 or more acres
C. Units with a commercial establishment or medical office on the property
D. Mobile home or trailer

The condominium value distribution is tabulated all "owner-occupied" condominium units; the condominium price asked distribution is tabulated for all "vacant-for-sale-only" condominium units. Selected monthly owner costs are not accumulated for condominium units.

34 Includes households with zero or negative income.

35 Multiply the aggregate value and price asked by $250 to obtain the true value or price asked. The tabulation was scaled by a factor of 250 for tally purposes.

36 "With central heating system" includes "steam or hot water system", "central warm-air furnace", "electric heat pump", "other built-in electric units", and "floor, wall, or pipeless furnace". "Lacking central heating system" includes "room heaters with flue", "room heaters without flue", "fireplaces, stoves, or portable room heaters", and "none".

37 Lacking complete plumbing (facilities) for exclusive use includes: completes plumbing (facilities) but also used by another household.

38 These counts are not available for summary levels on STF 3, file B. Zero (0) will be shown.

39 See Appendix B2[2] for language codes.

40 See Appendix B3[2] for ancestry codes and for definition of single and multiple ancestry.

41 See Appendix B4[2] for definition of inmate status (noninstitutional and institutional) and for type of group quarters codes.

42 See Appendix B5[2] for industry codes.

43 See Appendix B6[2] for occupation codes.

44 Per capita income is calculated by dividing the aggregate income for persons 15 years and over by the total number of persons in the group.

45 See Appendix B7[2] for definitions of labor force status categories.

46 Period of service includes "May 1975 or later", "Vietnam era", "February 1955 to July 1964", "Korean Conflict", "World War II", "World War I", and "other service". Tabulations of "other" include all categories not shown separately in the matrix.

47 See Appendix B5[2] for race codes.

48 Includes cases classified as "reported" and as "not reported" for place of work.

49 Excludes Armenian, Georgian, Ruthenian, Ukrainian, and Belorussian.

50 Each sample person and housing unit was assigned a weight as the result of a complex ratio estimation procedure.

Sample housing units were assigned one weight each and sample persons were assigned two types of weights. The first weight for persons applies to sample data except place of work, travel time to work, and migration (i.e., residence in 1975) tabulations; this weight was assigned to all sample persons. The second weight for persons, which applies to place of work, travel time to work, and migration data, was assigned to those sample persons who were included in he place of work and migration coding operation. These weights vary from person to person and from housing unit to housing unit, but on the average they are approximately equal to the inverse of each records sample selection probability. the tabulations in this file are based on summing the weights of the appropriate persons or housing units relating to the tabulation. For specified aggregates, indicated below, the characteristic data are multiplied by the weight; for example, in aggregate income for persons the amount of income is multiplied by the weight. In medians, the weights are brought to bear indirectly through the distribution used to calculate the measure. For family and household tabulations (population type), only the weights of the householder are used. For subfamily tabulations, the weights used are those assigned to the subfamily reference person (i.e., the person who is the equivalent of a householder for the subfamily). The following is a listing of the weights used in producing each tabulation:[2]

Persons Weights--
Tabulations 1, 7, 8, 12-17, 19, 22, 24-67, 81-85, and 90-95.

Note: Tabulations 31, 60, 64, 83, and 84 are aggregates.
Tabulations 34-39, 41, and 42 use the place of work, travel time to work, and migration weight exclusively. Tabulation 42 is an aggregate.
Tabulations 82 and 85 are derived measures.

Householder (person) Weights--
Tabulations 9, 10, 18, 20, 21, 68-80, and 86-89.

Note: Tabulations 70, 72, 77, 78, and 80 are aggregates.
Tabulations 69 and 74 are derived measures.

Subfamily Reference Person Weight--
Tabulation 23.

Housing Unit Weights--
Tabulations 4, 11, and 96-150.

Note: Tabulations 100, 101, 104, 128, 129, 137, 140 and 141 are aggregates.
Tabulations 127 and 134 are derived measures.

Unweighted Counts--
Tabulations 2, 3, 5, and 6.

Note: Tabulations 2 and 5 are actual (unit) counts of persons and housing units in the sample.
Tabulations 3 and 6 are 100 percent counts of persons and housing units.

51 Includes females who are a householder, a spouse of householder, a mother in a mother-child subfamily, or a female spouse in a married-couple subfamily.

52 Not used.

53 Code ranges may include codes which are not used.

54 "Unrelated individuals" include nonrelatives in family households, persons in nonfamily households, and noninmates in group quarters.

55 The term "cell not used" indicates that a data item or "cell" contains no data.

56 Not used.

CONDENSED CENSUS FILE

The condensed census file output by CREATE7A is input to the program CREATE5A. This file differs from STF3A in that, when possible, data fields are combined or eliminated in an effort to reduce the file size and processing time.

FILE NAME: Condensed Census File

RECORD NAME/DESCRIPTION: Record 01

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Record Position

First	Last	Length	Format[b]	Variable Name	Description
1	4	4		MU	Major Unit (e.g., NEDS State ID)
5	8	4		EU	Emission Unit (e.g., NEDS County, ID, APCD, AQCR)
9	10	2		ESU	Emission Subunit or blank
13	16	4		NUMAQ	Special emission unit value (e.g., APCD, AQCR)
17	20	4		ISEQ	CREATE7A input sequence number or zero (0)[a]
21	28	8		HDATE	Date hash table created
29	36	8		HTIME	Time hash table created
37	44	8		RDATE	Date of CREATE7A run
45	52	8		RTIME	Time of CREATE7A run
53	54	2		AYR	Last two digits of census year
55	59	5		AFID	Five character census file ID (= 'STF3A')
60	69	10		LABEL	Program identifier (e.g., 'CREATE7A-B')
70	73	4		SUMRYLVL	Census summary level
74	75	2		URBARURL	Urban-rural classification code Inside/outside SMSA's component
76	77	2		PSAD	Political/Statistical area description code

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[a] Zero indicates sorted generated emission unit records.

[b] The condensed census file is unformatted (binary).

FILE NAME: Condensed Census File

RECORD NAME/DESCRIPTION: Record 01

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Record Position

First	Last	Length	Format	Variable Name	Description
79	79	1		REGION	Region code
80	81	2		STATEGEO	Census state code
82	83	2		STATE	FIPS state code
84	87	4		SMSA	Standard Metropolitan Statistical Area
88	91	4		COUNTY	FIPS County Code (level 11)
92	95	4		MCD	Minor civil division or census county division code (level 12)
96	99	4		PLACE	Census place, complete (level 13)
100	105	6		TRACT	Census tract, complete (level 14)
106	106	1		BLKGRP	Census block group, complete (level 15)
107	107	1		PARTPLAC	Census place, partial (level 13)
108	108	1		PATTRCT	Census tract, partial (level 14)
109	109	1		PARTBLK	Census block, partial (level 15)
110	110	1		EDIND	Census enumeration district indicator (level 16)
111	114	4		EDNUMBER	Census enumeration district number
115	115	1		EDSUFFIX	Census enumeration district suffix
116	117	2		SCSA	FIPS standard consolidated area (SCSA) code
118	121	4		URBAREA	Urbanized area (UA) code
122	125	4		MCDSEQNO	MCD sequence number
126	126	1		SMSASIZE	Standard Metropolitan Statistical Area (SMSA) size code
127	127	1		UATYPE	Urbanized area (UA) type
128	128	1		UASIZE	Urbanized area (UA) size code
129	129	1		PLACDESC	Place description code
130	130	1		PLACSZE	Place size code

FILE NAME: Condensed Census File

RECORD NAME/DESCRIPTION: Record 01

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Record Position

First	Last	Length	Format	Variable Name	Description
131	131	1		CITY	Extended city indicator code
132	132	1		CBD	Central business district code
133	134	2		MCDCCDSZ	MCD/CCD size code
135	138	4		LONGITUD	Longitude of centroid (ten-thousandths of degrees)
139	142	4		LATITUDE	Latitude of centroid (ten thousandths of degrees)
143	146	4		LAND	Land area (square miles)
147	162	16			Higher category name
163	178	16		AREANAME	Category name
179	179	1		SUPFLG08	Occupied housing unit suppression flag
180	223	44		TABX(N)	Tabulated data[a]

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[a] N ranges from 1 to 11 and is defined as follows:

CREATE5A	CREATE7A	CENSUS	DESCRIPTION
DATA(1)	DATA(1)	TAB1(1)	TOTAL POPULATION
DATA(2)	DATA(2)	TAB1(3)	RURAL POPULATION
DATA(4)	DATA(3)	TAB4(1)	TOTAL HOUSING
DATA(5)	DATA(4)	TAB4(3)	RURAL HOUSING
DATA(6)*	DATA(5)	TAB11(3)	VACANT HOUSING
DATA(7)	DATA(6)	TAB112(1)	GAS-FUEL HOUSING
DATA(8)	DATA(7)	TAB112(4)	OIL, KEROSENE HOUSING
DATA(9)	DATA(8)	TAB112(5)	COAL, COKE HOUSING
DATA(10)	DATA(9)	TAB112(6)	WOOD FUEL HOUSING
DATA(11)	DATA(10)	TAB112(7)	OTHER-FUEL HOUSING

*DATA(6) IS LATER MODIFIED, IN STATEMENT 345 to CONTAIN URBAN HOUSING COUNTS. DATA(3) IS DEFINED IN STATEMENT 340 AS URBAN POPULATION.

SUPPRESSION STATISTICS FILE

The Suppression Statistics file contains suppression counts for each county or APCD. This allows the user to determine if housing and population counts allocated to the subcounty level contain an excessive fraction of suppressed counts. This file is a descriptive message file and, therefore, no format is provided. For information regarding suppression statistics, refer to the Summary Tape File 3 Technical Documentation.

PROGRAM MESSAGE AND SUMMARY PRINTOUT FILE

This file contains program messages, summary printouts, and diagnostic information for execution of CREATE7A. This file is a descriptive message file and, therefore, no format is provided.

CREATE5A CONTROL OPTIONS FILE

The control options file for the program CREATE5A consists of four record types: First (File) Control record, Second (Grid) Control record, Third (ENAMAP) Control record, and Fourth Control record. Each control record contains a grid and record identifier. The File Control record identifies the output files to be created. The Grid record specifies grid boundaries, limits, and latitudinal/longitudinal increments. The ENAMAP record is used to generate factors for the ENAMAP grid (defined by WLNG - 84, ELNG - 69, NLAT - 45, SLAT - 38). The final control record defines the file sequence for tape processing.

The control options selected for NAPAP processing are as follows:

GRDDER (-GRB,GRC,GRD) - CONTUS
ESUC - 0
JSEQ - 0
Output Files: - TOTPOP,TOTHSG
NEDSF - 0
NERRMG - 0
NERRAB - 0
NERRMX - 999.

Options for control parameters not given above are defined with individual record formats.

FILE NAME: CREATE5A Control Options File

RECORD NAME/DESCRIPTION: First (File) Control Record

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Record Position

First	Last	Length	Format	Variable Name	Description
1	8	8	A8	GRDDER	Grid name[a]
10	10	1	A1	IDA	Identifier required for first control record ('A')
12	12	1	I1	ESUC	Switch to set key emission subunits to zero before sorts are made (0 - NO [normal]; 1 - yes)
13	13	1	I1	JSEQC	Switch to set key sequence number field to zero before sorts are made (0 - no [normal]; 1 - yes)
15	80	66	11A6		Six character names of 1-11 files to be created[b]

---

[a] Possible choices for this variable are: NEROS, CONTUS, CONTUSR, ENAMAP, or another grid not prespecified. For 1980 NAPAP Processing, GRDDER - 'CONTUS'

[b] Six-character names of the 1-11 possible files to be created include:

TOTPOP	Total population
RURPOP	Rural population
URBPOP	Urban population
TOTHSG	Total housing
RURHSG	Rural housing
URBHSG	Urban housing
GASHSG	Housing heated with natural gas
OILHSG	Housing heated with oil or kerosene
COLHSG	Housing heated with coal or coke
WODHSG	Housing heated with wood
OTHHSG	Housing heated by other means (e.g., electricity)

FILE NAME: CREATE5A Control Options File

RECORD NAME/DESCRIPTION: Second (Grid) Control Record

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Record Position

First	Last	Length	Format	Variable Name	Description
1	8	8	A8	GRB	Grid name (as specified in first control record
10	10	1	A1	IDB	Identifier required for the second control record ('B')
12	15	4	I4	NCOL	Number of columns in grid (156 for 'CONTUS')
16	19	4	I4	NROW	Number of rows in grid (240 for 'CONTUS')
21	27	7	F7.4	ALON1	Longitude of southwest corner of grid (25 for 'CONTUS')
29	34	6	F6.4	ALAT1	Latitude of southwest corner of grid (125 for 'CONTUS')
36	41	6	F6.4	ALAT2	Latitude of northeast corner of grid (51 for 'CONTUS')
43	49	7	F7.4	ALON2	Longitude of northeast corner of grid (65 for 'CONTUS')
51	57	7	F7.4	DLON	Longitudinal increment (degrees) for each grid cell (0.2500 for 'CONTUS')
59	64	6	F6.4	DLAT	Latitudinal increment (degrees) for each grid cell (0.1667 for 'CONTUS')
66	66	1	I1	NEDSF	Switch to convert from FIPS to NEDS (0-No [normal], 1-yes)
68	68	1	I1	NERRMG	Switch to print error messages (0-No, 1-yes [normal])
69	69	1	I1	NERRAB	Switch to abort when limit on error messages has been reached (0-No, 1-yes [normal])
71	73	3	I3	NERRMX	Number of error messages to print (0-999)

FILE NAME: CREATE5A Control Options File

RECORD NAME/DESCRIPTION: Third (ENAMAP) Control Record

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Record Position

First	Last	Length	Format	Variable Name	Description
1	8	8	A8	GRC	Grid identifier (as in first and second control records)
10	10	1	A1	IDC	Identifier required for third control record ('C')

NOTE: Other ENAMAP control variables are not provided at this time.

FILE NAME: CREATE5A Control Options File

RECORD NAME/DESCRIPTION: FOURTH CONTROL RECORD (OPTIONAL)[a]

Page 1 of 1

Record Position

First	Last	Length	Format	Variable Name	Description
1	8	8	A8	GRD	Grid identifier (as in first, second, and third control records)
10	10	1	A1	IDD	Required identifier for fourth control ('D')
12	13	2	I2	NFILE1	Tape file sequence number of first file to process (normally 1, but may be 1-50)
15	16	2	I2	NFILE2	Tape file sequence number of last file to process (normally 50, but may be 1-50)
18	22	5	I5	NLAST	Direct access reference number of last record in the file just before NFILE1 (if NFILE1 = 1, then NLAST=0)
24	39	16	A16	RCNTY1	First county in series for which detailed records are desired (leave blank if none)
41	56	16	A16	RCNTY2	Last county in series for which detailed records are desired (leave blank if none)

---

[a] Note that this record is optional. If it is omitted, the computer will read from the point where the input tape is positioned. Output will start at position 1 of the random access file. Only one input file will be read. If the first file is given as 1, the tape will not be rewound or repositioned, but the user may specify the starting point. However, the last record written (NLAST) would still be zero.

CREATE5A ALLOCATION FILE

CREATE5A generates 1-11 county-to-grid allocation files, one for each surrogate. For 1980 NAPAP processing two allocation files were created: total population and total housing. The formats for these files are identical.

FILE NAME: CREATE5A Allocation File

RECORD NAME/DESCRIPTION: Header Record

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Record Position

First	Last	Length	Format[a]	Variable Name	Description
				CDATE5	Date of run
				CTIME5	Time of run
				GRDDER	Grid name
				NCOL	Number of columns in grid
				NROW	Number of rows in grid
				ALON1	Longitude west of southwest corner of grid
				ALAT1	Longitude west of southwest corner of grid
				ALAT2	Latitude north of northeast corner of grid
				ALON2	Longitude west of northeast corner of grid
				DLON	Longitudinal increment (degrees) of each cell
				DLAT	Latitudinal increment (degrees) of each cell
				ALONR[b]	Longitude of center of grid (degrees)
				ALATR[b]	Latitude of center of grid (degrees)
				DXY[b]	Size of each grid cell
				IXO[b]	Horizontal grid offset
				IYO[b]	Vertical grid offset
				IDUM[b]	Dummy padding

---

[a] The CREATE5A Allocation File is unformatted (binary)

[b] ALONR, ALATR, DXY, IXO, IYO, and IDUM are ENAMAP Control Variables. These are initialized to zero for NAPAP processing.

FILE NAME: CREATE5A Allocation File

RECORD NAME/DESCRIPTION: Allocation Record

Page 1 of 1

Record Position

First	Last	Length	Format[a]	Variable Name	Description
				EID1	NEDS state and county (or city) code
				EID2	(FIPS state code x 1000) + county (or city) code
				ESTATE	Abbreviated state name
				ECNTY	County (or city) name
				SUM(N)[b]	Sum of surrogate data for the county
				NCELL	Number of grids in the county
				ICOL(L)[c]	Column number
				IROW(L)[c]	Row number
				V(L,N)[c]	Surrogate data for the grid
				V(L,N)/SUML(N)	Percent of county's surrogate data allocated to the grid

---

[a] The CREATE5A Allocation file is unformatted (binary).

[b] N is the number of counties processed.

[c] L is equal to NCELL. These variables are repeated NCELL times for each county.

CREATE5A CENSUS ALLOCATION FILE(S) AS INPUT TO VIRGINIA

The Allocation File output by CREATE5A is input to VIRGINIA to adjust for Virginia's independent cities. The program divides the census data into County and City records. Variable names for both records are provided.

FILE NAME: Allocation File

RECORD NAME/DESCRIPTION: County Record

Page 1 of 1

Record Position

First	Last	Length	Format[a]	Variable Name	Description
				EID1	NEDS State and county code
				EID2	=(FIPS state code x 1000) + FIPS county code
				STATE	Abbreviated state name
				CNTY	County name
				SUM	Sum of surrogate data for the county
				NGRID	Number of grids in the county
				COL(L)[b]	Column number
				ROW(L)[b]	Row number
				DAT(L)[b]	Surrogate data for the grid
				YPRCNT(L)[b]	Percent of county's surrogate data allocated to the grid

---

[a] The Allocation File is unformatted (binary).

[b] L is equal to NGRID. NOTE: These variables are repeated NGRID times.

FILE NAME: Allocation File RECORD NAME/DESCRIPTION: City Record

Page 1 of 1

Record Position

First	Last	Length	Format[a]	Variable Name	Description
				CEID1	NEDS State and city code
				CEID2	=(FIPS state code x 1000) + city code
				CSTATE	Abbreviated state name
				CCNTY	City name
				CSUM	Sum of surrogate data for the city
				CNGRID	Number of grids in the city
				CCOL(L)[b]	Column number
				CROW(L)[b]	Row number
				CDAT(L)[b]	Surrogate data for the grid
				CPRCNT(L)[b]	Percent of city's surrogate data allocated to the grid

---

[a] The Allocation File is unformatted (binary).

[b] L is equal to CNGRID. NOTE: These variables are repeated CNGRID times.

LAND USE/COVER INPUT DATA

The land use and land cover data (IREAD) created by Lockheed Engineering and Management Services Company is a binary file containing the latitude, longitude and percent of 10 land use categories covering approximate 20 x 20 km grid cells in the contiguous U.S. The land use/cover categories in this file are urban land, agricultural land, rangeland, deciduous forest land, coniferous forest land, mixed forest land, water, barren land, non-forested wetland, and mixed agricultural land and rangeland. This file is the primary input for the program NEWLAND.

SPATIAL FACTOR PROCESSING DOCUMENTATION

DOCUMENTATION OF SPATIAL ALLOCATION PROCEDURES
FOR THE 1980 NAPAP EMISSIONS INVENTORY
INPUT/OUTPUT DESCRIPTION

August 1988

FILE NAME: Land Use/Cover Input Data

RECORD NAME/DESCRIPTION: Land Use Percentages

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Record Position

First	Last	Length	Format[a]	Variable Name	Description
				LAT	Latitude of the center point of grid cell
				LON	Longitude of the center point of grid cell
				PERCNT(1)	Percent of grid cell covered by urban land
				PERCNT(2)	Percent of grid cell covered by agricultural land
				PERCNT(3)	Percent of grid cell covered by rangeland
				PERCNT(4)	Percent of grid cell covered by deciduous forest
				PERCNT(5)	Percent of grid cell covered by coniferous forest
				PERCNT(6)	Percent of grid cell covered by mixed forest land
				PERCNT(7)	Percent of grid cell covered by water bodies
				PERCNT(8)	Percent of grid cell containing land falling outside study area
				PERCNT(9)	Percent of grid cell covered by nonforested wetland
				PERCNT(10)	Percent of grid cell covered by mixed agricultural land and rangeland

---

[a] File structure is unformatted (binary).

COUNTY-GRID AREA RELATIONSHIPS

The county-to-grid file (KGRID), accessed by the program NEWLAND, contains county fractions by grid cell. Variables include the number of counties overlaying each cell, the NEDS county ID, and the percent of each county contained in each grid cell. This allows the user to reformat the supplied land use fractions reported as the percent of land use per 1/4 degree longitude by 1/6 degree latitude grid to the fraction of each county's land use within each grid cell.

FILE NAME: County-Grid Area Relationships

RECORD NAME/DESCRIPTION: County-Grid Area Relationships Record

Page 1 of 1

Record Position

First	Last	Length	Format	Variable Name	Description
2	6	5	I5	GRIDNO	Grid cell number
8	9	2	I2	MCNTY	Number of counties overlaying grid cell
11	16	6	I6	ICNTY(I)[a]	NEDS county ID
18	20	3	I3	IPCT(I)[a]	Percent of county contained in grid cell

---

[a] These variables are repeated I times, where I = 1 to MCNTY.

COUNTY LAND USE BY GRID CELL

The county land use by grid cell file is output from the program NEWLAND. The file contains grid cell number, NEDS state/county ID, the latitude and longitude of the center point of the grid cell (degrees), the area of the grid cell, the fraction of the grid cell in the county, and the spatial fractions for 12 land use surrogates. This file is accessed by the program SPACEMERGE such that land use and census surrogates may be merged to form a complete file of spatial surrogate fractions. In SPACEMERGE, the variables GRIDNO, LAT, and LONG are referenced as IGRIDNO, CLAT, and CLONG.

FILE NAME: County Land Use By Grid Cell

RECORD NAME/DESCRIPTION: County Land Use Fractions By Grid Cell

Page 1 of 1

Record Position

First	Last	Length	Format	Variable Name	Description
1	5	5	I5	GRIDNO	Grid cell number
6	13	8	F8.5	PCT	Fraction of grid cell in county
14	19	6	I6	JCNTY	NEDS State/County ID
20	25	6	F6.2	LAT	Latitude of the center point of grid cell
26	31	6	F6.2	LONG	Longitude of the center point of grid cell
32	37	6	F6.2	AREAGD	Area of grid cell
38	42	5	F5.3	APFTR(1)	Fraction of the county's urban land use residing in grid cell
43	47	5	F5.3	APFTR(2)	Fraction of the county's agricultural land use residing in grid cell
48	52	5	F5.3	APFTR(3)	Fraction of the county's rangeland residing in grid cell
53	57	5	F5.3	APFTR(4)	Fraction of the county's deciduous forest land residing in grid cell
58	62	5	F5.3	APFTR(5)	Fraction of the county's coniferous forest land residing in the cell
63	67	5	F5.3	APFTR(6)	Fraction of the county's mixed forest land residing in grid cell
68	72	5	F5.3	APFTR(7)	Fraction of the county's water bodies residing in grid cell
73	77	5	F5.3	APFTR(8)	Fraction of the county's land falling outside the study area
78	82	5	F5.3	APFTR(9)	Fraction of the county's nonforested wetlands residing in grid cell
83	87	5	F5.3	APFTR(10)	Fraction of the county's mixed agricultural land and rangeland residing in grid cell
88	92	5	F5.3	APFTR(11)	Fraction of the county's composite forest land residing in grid cell
93	97	5	F5.3	ARAT	Fraction of county area contained in grid cell

NEWLAND SUMMARY PRINTOUT

The summary printout from NEWLAND contains program messages, summary printouts, diagnostic information and any error messages. This file is a descriptive message file and, therefore, no format is provided.

MASSACHUSETTS ADJUSTMENT FILE

The Massachusetts Adjustment File is used by SPACEMERGE to assign grid cells to APCDs based on a column/row match between the adjustment file and the land use spatial fraction file. If a column and row match is found for more than one APCD, the grid cell is assigned to a single APCD based on the value of population in the adjustment file.

FILE NAME: Massachusetts Adjustment File   RECORD NAME/DESCRIPTION: Adjustment Record

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Record Position

First	Last	Length	Format	Variable Name	Description
1	6	6	I6	ID	NEDS State/APCD Id
7	9	3	I3	JCOL	Column number
10	12	3	I3	JROW	Row number
13	19	7	I7	JPOP	Population for the APCD-grid cell

CENSUS ALLOCATION FILES AS SPACEMERGE INPUT

The housing and population files for SPACEMERGE input are formatted the same as those input to VIRGINIA (see County record), although variable names have been slightly modified. Variable names and descriptions as applied to SPACEMERGE follow.

FILE NAME: Allocation File As Space-Merge Input

RECORD NAME/DESCRIPTION: Allocation Record

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Record Position

First	Last	Length	Format[a]	Variable Name	Description
				IEID1	NEDS State and County code
				IEID2	=(FIPS state code x 1000) + county (or city) name
				STATE	Abbreviated state name
				CTY	County (or city) name
				ISUM	Sum of surrogate data for the county
				NGRID	Number of grids in the county
				ICOL(L)[b]	Column number
				IROW(L)[b]	Row number
				IDAT(L)[b]	Surrogate data for the grid
				CPRCNT(L)[b]	Percent of county's surrogate data allocated to the grid

---

[a] The Allocation File is unformatted (binary).

[b] L is equal to NGRID. NOTE: These variables are repeated NGRID times.

SPATIAL ALLOCATION FRACTION FILE

The spatial allocation fraction file is the resultant output from the program SPACEMERGE. The file contains NEDS State/County ID, column number, row number, and spatial allocation fractions for 14 surrogate land use and census categories. Prior to input into SAFP, this file is converted from UNIVAC ASCII to IBM EBCDIC characters. The file format on the following page represents the UNIVAC ASCII version of this file. Once in SAFP, this file is matched to the surrogate selection file such that spatial surrogates may be assigned to area source categories.

FILE NAME: Spatial Allocation Fraction File

RECORD NAME/DESCRIPTION: Spatial Allocation Fractions Record

Page 1 of 1

Record Position

First	Last	Length	Format	Variable Name	Description
1	6	6	I6	JCNTY	NEDS State/County ID
7	10	4	I4	LCOL	Grid cell column
11	14	4	I4	LROW	Grid cell row
15	18	4	I4	ISPAL(1)[a]	Spatial fraction for population
19	22	4	I4	ISPAL(2)[a]	Spatial fraction for housing
23	26	4	I4	ISPAL(3)[a]	Spatial fraction for urban land use
27	30	4	I4	ISPAL(4)[a]	Spatial fraction for agricultural land use
31	34	4	I4	ISPAL(5)[a]	Spatial fraction for rangeland
35	38	4	I4	ISPAL(6)[a]	Spatial fraction for deciduous forest land
39	42	4	I4	ISPAL(7)[a]	Spatial fraction for coniferous forest land
43	46	4	I4	ISPAL(8)[a]	Spatial fraction for mixed forest land
47	50	4	I4	ISPAL(9)[a]	Spatial fraction for water bodies
51	54	4	I4	ISPAL(10)[a]	Spatial fraction for land falling outside study area
55	58	4	I4	ISPAL(11)[a]	Spatial fraction for nonforested wetland
59	62	4	I4	ISPAL(12)[a]	Spatial fraction for mixed agricultural land and rangeland
63	66	4	I4	ISPAL(13)[a]	Spatial fraction for composite forest land
67	70	4	I4	ISPAL(14)[a]	Spatial fraction for total county land area in grid cell

---

[a] Spatial fractions are fractions *10000 so they may be formatted as integer variables for output.

SPACEMERGE MESSAGE FILE

The SPACEMERGE diagnostic message file provides program processing messages, error messages, and other diagnostic information. This file is a descriptive processing summary and, therefore, no format is given.

SAFP CONTROL FILE

The SAFP control file contains one record and two variables: SAFNUM and DEFSUR. SAFNUM tells the program how many spatial surrogates are contained in the Spatial Allocation Fraction File. The variable DEFSUR defines the code corresponding to the spatial surrogate category to be used as a default when warranted by the program. For NAPAP processing, SAFNUM-14 and DEFSUR-1.

FILE NAME: SAFP Control File

RECORD NAME/DESCRIPTION: Control Options Record

Page 1 of 1

Record Position

First	Last	Length	Format	Variable Name	Description
1	2	2	I2	SAFNUM	Number of surrogates in spatial allocation fraction file
4	5	2	I2	DEFSUR	Default surrogate number to replace a spatial fraction of zero

SURROGATE SELECTION FILE

The surrogate selection file is accessed by the program SAFP. Two fields of data are contained in this file: Area source category number and the corresponding code for the assigned spatial surrogate. The number of records is dependent on the number of area source categories used in the emissions file. Area source categories and corresponding spatial surrogates are given in various references.[2,3]

FILE NAME: Surrogate Selection File

RECORD NAME/DESCRIPTION: Surrogate Selection Record

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Record Position

First	Last	Length	Format	Variable Name	Description
1	5	5	I5	SSF(J,1)	Area source category number (J=1 to number of categories read)
7	8	2	I2	SSF(J,2)	Surrogate selection for SSF(J,1)

SPATIAL ALLOCATION FRACTION FILE

The spatial allocation fraction file is the resultant output from SPACEMERGE. The file contains NEDS State/County ID, column number, row number, and spatial allocation fractions for 14 surrogate land use and census categories. Prior to input into SAFP, this file is converted from UNIVAC ASCII to IBM EBCDIC characters. The format on the following page represents the IBM EBCDIC version of this file. Once in SAFP, this file is matched to the surrogate selection file such that spatial surrogates may be assigned to area source categories.

FILE NAME: Spatial Allocation Fraction File

RECORD NAME/DESCRIPTION: Spatial Fractions Record

Page 1 of 1

Record Position

First	Last	Length	Format	Variable Name	Description
1	6	6	I6	NEDSID	State/county NEDS ID
7	10	4	I4	COL(NGRID)[a]	Grid column
11	14	4	I4	ROW(NGRID)[a]	Grid row
15	18	4	I4	SAF(NGRID,J)[a,b,c]	Spatial allocation fractions

---

[a] NGRID is the number of grids per county (≤160),

[b] J-NUMSAF (the number of surrogates in the spatial allocation fraction file), where J≤30.

[c] Spatial fractions are fractions *10000 so they may be formatted as integer variables for output.

NOTE: Positions 15-18 are repeated J times (14 for 1980 NAPAP); positions 7-14 and 15-(15+ 4J) are repeated NGRID times.

SPATIAL ALLOCATION FACTOR FILE

The Spatial Allocation Factor File is the final output from the spatial allocation factor processing. The information contained in this file includes NEDS State/County ID, Area Source SCC, the number of grids in each county, column number, row number, and spatial allocation factors for each SCC, state, county, column, and row.

SPATIAL FACTOR PROCESSING DOCUMENTATION

DOCUMENTATION OF SPATIAL ALLOCATION PROCEDURES
FOR THE 1980 NAPAP EMISSIONS INVENTORY
INPUT/OUTPUT DESCRIPTION

August 1988

FILE NAME: Spatial Allocation Factor File

RECORD NAME/DESCRIPTION: Spatial Factors Record

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Record Position

First	Last	Length	Format	Variable Name	Description
1	6	6	I6	NOWCTY	ID of current State/county
7	11	5	I5	SSF(J,1)	Area source category number (J-1 to number of categories read)
12	14	3	I3	NGRID	Number of grids in county
15	18	4	I4	COL(NGRID)[a]	Grid column
19	22	4	I4	ROW(NGRID)[a]	Grid row
23	26	4	I4	SAF(NGRID,SSF)[b]	Spatial allocation factors

---

[a] NGRID is the number of grids per county (≤160)

[b] SSF - SSF(J,2) - the surrogate selection for SSF (J,1)

NOTE: Positions 15-26 are repeated NGRID times

5.0 CONTROL STATEMENTS

CONTROL STATEMENTS

Execution of the various spatial factor processing programs requires Executive Control Language (ECL) for programs executed on the Sperry UNIVAC and Job Control Language (JCL) for those run on the IBM 3090. UNIVAC or IBM operating system control statements requires a working knowledge of ECL and JCL by the user. Control Statements for the individual programs follow.

CREATE7A EXECUTION

Execution Deck

```
 1.  @RUN,priority Runid,Acct#/Userid,Project/UID,60
 2.  @CAT,P   mess7a(+1).
 3.  @ASG,A   mess7a
 4.  @BRKPT   PRINT$/mess7a
 5.  @ASG,A   CONTROL7A.
 6.  @USE     5.,CONTROL7A.
 7.  @ASG,A   ihash.
 8.  @USE     9.,ihash.
 9.  @ASG,A   UPDATE.
10.  @USE     10.,UPDATE.
11.  @ASG,A   MSG7A.
12.  @USE     4.,MSG7A.
13.  @ASG,A   DCFLAG.
14.  @USE     8.,DCFLAG.
15.  @ASG,T   DCOUT.,U9S,reel#,0,RING
16.  @MOVE    DCOUT.,position
17.  @USE     12.,DCOUT
18.  @XQT     CREATE7A.FOR
19.  @BRKPT   PRINT$
```

User Supplied ECL

Line 1. Enter standard run card data.

Lines 2, 3 and 4. User may, if desired, replace 'Mess7A' with another unique file name. (This system message file has a default assignment to unit 6.)

Lines 7 and 8. Replace 'ihash' with the name of the FIPS to NEDS code conversion file.

Line 15. Replace 'reel#' with an assigned Sperry volser.

Line 16. If the states being executed are consecutive or for exectuion of the first state, omit this line. Otherwise replace 'position' with the tape position number for subsequent state executions, e.g., replace 'position' with '1' for execution of a second state, replace 'position' with '2' for execution of a third state, etc.

All other file names must remain as indicated above.

CREATE5A EXECUTION

Execution Deck

```
 1.  @RUN,priority Runid,Acct#/Userid,Project/UID
 2.  @CAT,P     Mess5a(+1).
 3.  @ASG,A     Mess5a.
 4.  @BRKPT     PRINT$/mess5a
 5.  @ASG,A     CONTROL5A.
 6.  @USE       7.,CONTROL5A.FOR.
 7.  @ASG,T     DCOUT.,U9S,reel #
 8.  @USE       10.,DCOUT.
 9.  @DELETE    TOTPOP.
10.  @CAT,P     TOTPOP.,F/0//9999
11.  @ASG,A     TOTPOP.
12.  @USE       11.,TOTPOP.
13.  @DELETE    RURPOP.
14.  @CAT,P     RURPOP.,F/0//9999
15.  @ASG,A     RURPOP.
16.  @USE       12.,RURPOP.
17.  @DELETE    URBPOP.
18.  @CAT,P     URBPOP.,F/0//9999
19.  @ASG,A     URBPOP.
20.  @USE       13.,URBPOP.
21.  @DELETE    TOTHSG.
22.  @CAT,P     TOTHSG.,F/0//9999
23.  @ASG,A     TOTHSG.
24.  @USE       14.,TOTHSG.
25.  @DELETE    RURHSG.
26.  @CAT,P     RURHSG.,F/0//9999
27.  @ASG,A     RURHSG.
28.  @USE       15.,RURHSG.
29.  @DELETE    URBHSG.
30.  @CAT,P     URBHSG.,F/0//9999
31.  @ASG,A     URBHSG.
32.  @USE       16.,URBHSG.
33.  @DELETE    GASHSG.
34.  @CAT,P     GASHSG.,F/0//9999
35.  @ASG,A     GASHSG.
36.  @USE       17.,GASHSG.
37.  @DELETE    OILHSG.
38.  @CAT,P     OILHSG.,F/0//9999
39.  @ASG,A     OILSHG.
40.  @USE       18.,OILHSG.
41.  @DELETE    COLHSG.
42.  @CAT,P     COLHSG.,F/0//9999
43.  @ASG,A     COLHSG.
```

```
44.  @USE      19.,COLHSG.
45.  @DELETE   WODHSG.
46.  @CAT,P    WODHSG.,F/0//9999
47.  @ASG,A    WODHSG.
48.  @USE      20.,WODHSG.
49.  @DELETE   OTHHSG.
50.  @CAT,P    OTHHSG.,F/0//9999
51.  @ASG,A    OTHHSG.
52.  @USE      21.,OTHHSG.
53.  @XQT      CREATE5A.FOR
54.  @BRKPT    PRINT$
```

User Supplied ECL

Line 1. Enter standard run card data.

Lines 2, 3 and 4. User may, if desired, replace 'mess5a' with another unique file name. (This system message file has a default assignment to unit 6).

Line 7. Replace 'reel #' with the Sperry volser indicated on Line 15 of CREATE7A's ECL.

All other file names must remain as indicated above; however, the @DELETE, @CAT, @ASG, @USE sequence can be elminated for any file not generated.

VIRGINIA EXECUTION

Execution Deck

```
 1.  @RUN,priority Runid,Acct#/Userid,Project/UID
 2.  @CAT,P    messva(+1).
 3.  @ASG,A    messva.
 4.  @BRKPT    PRINT$/messva
 5.  @CAT,P    MSGVA(+1).
 6.  @ASG,A    MSGVA.
 7.  @USE      7.,MSGVA.
 8.  @ASG,A    out-file.
 9.  @USE      21.,out-file
10.  @XQT      VIRGINIA.FOR
11.  @BRKPT    PRINT$
```

User Supplied ECL

Line 1. Enter standard run card data.

Lines 2, 3 and 4. User may, if desired, replace 'messva' with another unique file name. (This system message file has a default assignment to unit 6).

Lines 8 and 9. Replace 'out-file' with the appropriate output file name from CREATE5A.

All other file names must remain as indicated above.

NEWLAND EXECUTION

Execution Deck

```
 1.  @RUN,priority Runid,Acct#/Userid,Project/UID
 2.  @CAT,P    messnew(+1).
 3.  @ASG,A    messnew.
 4.  @BRKPT    PRINT$/messnew
 5.  @ASG,A    ACID*PTLANDU-IN.
 6.  @USE      10.,ACID*PTLANDU-IN.
 7.  @ASG,A    ACID*PTGRID-IN.
 8.  @USE      9.,ACID*PTGRID-IN.
 9.  @ASG,A    ACID*PTLAND-OUT.
10.  @USE      15.,ACID*PTLAND-OUT.
11.  @ASGA     ACID*PTLAND-PRINT.
12.  @USE      31.,ACID*PTLAND-PRINT.
13.  @XQT      NEWLAND.FOR
14.  @BRKPT    PRINT$
```

User Supplied ECL

Line 1. Enter standard run card data.

Lines 2, 3 and 4. User may, if desired, replace 'messnew' with another unique file name. (This system message file has a default assignment to unit 6).

All other file names must remain as indicated above.

SPACEMERGE EXECUTION

Execution Deck

```
 1.  @RUN,priority Runid,Acct#/Userid,Project/UID
 2.  @CAT,P    messmrg(+1).
 3.  @ASG,A    messmrg.
 4.  @BRKPT    PRINT$/messmrg
 5.  @ASG,A    ACID*SPACE-MESS.
 6.  @USE      12.,ACID*SPACE-MESS.
 7.  @ASG,A    ACID*PTLAND-OUT.
 8.  @USE      21.,ACID*PTLAND-OUT.
 9.  @ASG,A    ACID*TOTHSG.
10.  @USE      22.,ACID*TOTHSG.
11.  @ASG,A    ACID*TOTPOP.
12.  @USE      23.,ACID*TOTPOP.
13.  @ASG,A    ACID*SPACE-OUT.
14.  @USE      11.,ACID*SPACE-OUT.
15.  @XQT      SPACEMERGE.FOR
16.  @ASG,A    ACID*MASSADJ.
17.  @USE      24.,ACID*MASSADJ.
18.  @BRKPT    PRINT$
```

User Supplied ECL

Line 1. Enter standard run card data.

Lines 2, 3 and 4. User may, if desired, replace 'messmrg' with another unique file name. (This system message file has a default assignment to unit 6).

All other file names must remain as indicated above.

SPERRY TO IBM TRANSFER

Execution Deck

```
 1.  //jobname JOB (account #,account information),name,
 2.  //  NOTIFY-userid,TIME-(minutes,seconds)
 3.  /*ROUTE PRINT HOLD
 4.  //COPIE EXEC PGM-IEBGENER
 5.  //SYSPRINT DD SYSOUT-A
 6.  //SYSIN DD DUMMY
 7.  //SYSUT1 DD UNIT-TAPE,VOL-SER-reel#,LABEL-(2,BLP),
 8.  //  DCB-(RECFM-FB,LRECL-80,BLKSIZE-8000),DISP-OLD
 9.  //SYSUT2 DD DSN-outfile,DISP-(NEW,CATLG,DELETE),
10.  //  UNIT-disk or tape
```

User Supplied JCL

Line 1. Enter standard job card data.

Line 7. Replace "reel#" with the Sperry volser (same as Line 14 of ECL for SPACEMERGE).FOR.

Line 9. Replace "outfile" with desired name for the EBCDIC version of the spatial fraction file. The unit type (disk or tape) will be a function of file size. When processing the contiguous U.S., a tape is recommended for output. The user must also specify the appropriate SPACE or LABEL parameters for the desired unit type.

SAFP EXECUTION

Execution Deck

```
 1. //jobname JOB (account #,account information),name,
 2. //  NOTIFY-userid,TIME-(minutes,seconds)
 3. /*ROUTE PRINT HOLD
 4. //JOBLIB DD DSN-library
 5. //FORT EXEC PGM-SAFP
 6. //FT03F001 DD DSN-infile1
 7. //FT04F001 DD DSN-infile2
 8. //FT05F001 DD DSN-infile3
 9. //FT06F001 DD SYSOUT-A
10. //FT15F001 DD DSN-outfile,
11. //   DISP-(NEW,CATLG,DELETE),UNIT-disk or tape,
12. //   DCB-(RECFM-FB,LRECL-1934,BLKSIZE-19340)
```

User Supplied JCL

Line 1. Enter standard job card data.

Line 4. Replace "library" with the name of the partitioned data set containing the SAFP load module.

Line 6. Replace "infile1" with the name of the EBCDIC spatial fraction file to be processed through SAFP (same as line 8 of JCL for Sperry to IBM transfer).

Line 7. Replace "infile2" with the name of the Surrogate Selection File.

Line 8. Replace "infile3" with the name of the SAFP Control Options File.

Line 10. Replace "outfile" with the name of the Spatial Allocation Factor File output data set name. The unit type and SPACE or LABEL parameters must also be specified.

6.0 REFERENCES

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2. Sellars, F.M., T.E. Fitzgerald, Jr., J.M. Lennon, L.J. Maiocco, N.M. Monzione, and D.R. Neal, Jr. National Acid Precipitation Assessment Program Emission Inventory Allocation Factors. EPA-600/7-85-035 (NTIS PB86-104247), U.S. Environmental Protection Agency, Washington, D.C. 180 pp. September 1985.

3. Wagner, J.K., R.A. Walters, L.J. Maiocco, and D.R. Neal. Development of the 1980 NAPAP Emissions Inventory, EPA-600/7-86-057a (NTIS PB88-132121), U.S. Environmental Protection Agency, Research Triangle Park, NC. 175 pp. December 1986.

4. Census of Population and Housing, 1980: Summary Tape File 3 Technical Documentation. Prepared by the Data User Services Division, Bureau of the Census. Washington: The Bureau. 437 pp. 1982.

5. Census of Population and Housing, 1980: Master Area Reference File (MARF)2 [machine-readable data file]/prepared by the Bureau of Census. Washington: The Bureau [producer and distributer]. 1983.

6. Page, S.H. National Land Use and Land Cover Inventory. Lockheed Engineering & Management Services Company, Inc. Remote Sensing Laboratory, Las Vegas, Nevada. Prepared for Office of Research and Development, U.S. Environmental Protection Agency, Las Vegas, Nevada. 7 pp. April 1980.

7. Sellars, F.M., M.J. Geraghty, A.M. Kiddie, B.J. Bosy, and S.V. Capone. The Northeast Corridor Regional Modeling Project Annual Emission Inventory Compilation and Formatting, Volume XVII, Development of Temporal, Spatial, and Species Allocation Factors. EPA-450/4-82-013q. U.S. Environmental Protection Agency, Washington, D.C. 125 pp. 1982.

APPENDIX A

PROGRAM LISTING FOR CREATE7A

```
C***********************************************************************
C
C     CREATE 7A
C
C     ACID RAIN RMDHS SUPPORT PROGRAM
C
C     READ 1980 CENSUS TAPE AND CREATE POPULATION
C     AND HOUSING FILES FOR USE IN ALLOCATING EMISSIONS
C
C     PROGRAM ORIGINALLY DESIGNED BY:
C        JOHN GRAHAM ... COMPUTER SCIENCES CORPORATION (CSC)
C           (919) 541-2998
C                     2305
C
C     PROGRAM CODED INITIALLY BY:
C        TOM FITZGERALD ... GCA/TECHNOLOGY DIVISION
C           (617) 275-5444
C
C     SUBSEQUENT PRODUCTION AND OTHER RESPONSIBILITIES AT GCA
C     ASSUMED BY:
C        DON NEAL
C           (617) 275-5444  EXT. 4076
C
C     PROGRAM MODIFIED BY JOHN GRAHAM THROUGH 11/7/84 TO ACCOM-
C     MODATE AUTOMATIC GENERATION OF ECL REQUIRED FOR ASSIGNING,
C     USING, AND FREEING CENSUS TAPE FILES CALLED FOR BY INFORMA-
C     TION IN THE CONTROL RECORDS.  CONTROL RECORD WAS ALSO MODIFIED
C     TO PERMIT SPECIFICATION OF A RANGE OF STATE TAPE ID VALUES.
C     CERTAIN OTHER SECTIONS OF CODE WERE MODIFIED.  OTHER
C     SECTIONS OF CODE WERE MODIFIED AND ANNOTATION ADDED.
C
C     PROGRAM FURTHER REVIEWED AND DEBUGGED BY TOM FITZGERALD AND JOHN
C     GRAHAM THROUGH 11/24/84.  WORK CONTINUED BY JOHN GRAHAM AND DON NEAL
C     THROUGH 2/22/85.
C
C     PROGRAM CERTIFIED 2/19/85 FOR OPTIONS 'N' AND 'R'.
C
C     THE PROGRAM MAY BE INVOKED FROM A DEMAND-MODE TERMINAL BY
C     INJECTING THE FOLLOWING ECL STATEMENT INTO THE RUNSTREAM
C     FOR MASSACHUSETTS:
C
C            @START  CREATE7A.NEWMA
C
C     AND FOR ALL OTHER STATES:
C
C            @START  CREATE7A.NEW
C
C     THE PROGRAM MAY ALSO BE INITIATED AT A BATCH TERMINAL BY
C     USING THE STATEMENTS PROVIDED IN THE RUNSTREAM FILES
C     IDENTIFIED BY THE ABOVE STATEMENTS.
C
C     INITIALLY AFTER EACH RUN THE FOLLOWING SAVES SHOULD BE MADE:
C
C       @ED,U ACID*RUN.NEW,ACID*RUN.EX7AMMNN
C       @ED,U ACID*RUN.CONTROL7A.,ACID*RUN.CN7AMMNN
C       @ED,U ACID*RUN.MESSAGE.,ACID*RUN.MS7AMMNN
C       @ED,U ACID*RUN.MSG7A.,ACID*RUN.PR7AMMNN
C       @ED,U ACID*RUN.DCFLAG.,ACID*RUN.FL7AMMNN
C
C      MM IS THE 2-DIGIT SEQUENCE NUMBER OF THE LAST FILE
C         CREATED ON THE OUTPUT TAPE IN THE RUN.
C      NN IS THE 2-DIGIT FIPS NUMBER OF THE LAST FILE
C         CREATED ON THE OUTPUT TAPE IN THE RUN.
C
C    FOR EXAMPLE, IF IDAHO IS THE LAST FILE IN THE RUN CREATED,
C    THEN MMNN - 1116.
```

```
C
C     IN FINAL PROCESSING THE MM AND NN CODES MAY HAVE THE FOLLOWING
C     MEANINGS IN FILES UNDER THE NAME 'ACID*F7A.':
C
C        MM IS THE POSTAL 2-LETTER CODE FOR THE FIRST STATE IN THE RUN.
C        NN IS THE POSTAL 2-LETTER CODE FOR THE LAST STATE IN THE RUN,
C           PROVIDED THE RUN TERMINATED NORMALLY (CHECK THE I.D. OF
C           THE NEXT RUN FILE TO BE SURE.)
C
C        FOR EXAMPLE, IF FLORIDA, GEORGIA AND IDAHO ARE RUN TOGETHER,
C        THE RUNSTREAM FILE SHOULD BE:
C
C             ACID*F7A.EXFLID    OR ACID*F7A.EXFL-ID
C
C     THESE SAME FILES SHOULD ALSO BE PRINTED IN THE INDICATED
C     ORDER UNDER THE RUN ID NAME CMMNN, WHERE MMNN HAVE THE
C     DESIGNATION GIVEN ABOVE.
C
C ***NOTE THAT THIS RUNSTREAM MUST BE UPDATED FOR EACH RUN OF
C     THE PROGRAM TO AVOID OVERWRITING EARLIER FILES.  SEE THE
C     WARNING IN THE SUBROUTINE KNTROL.
C
C ***A NEW DCFLAG FILE MUST BE SPECIFIED FOR EACH RUN ALSO IF
C     OLDER SUPPRESION FILES ARE NOT TO BE OVERWRITTEN.
C
C ***EACH CHANGE IN THE PROGRAM SHOULD BE REFLECTED IN A CHANGE
C     IN THE VERSION LABEL.  SEE 'LABEL=' ASSIGNMENT STATEMENT
C     AFTER THE DATA STATEMENTS BELOW.
C
C-----------------------------------------------------------------------
C
C     PROGRAM DESCRIPTION
C
C     THIS PROGRAM ABSTRACTS FROM EPA'S STF3A CENSUS TAPES, 69 OF
C     WHICH ARE CATALOGUED ON THE ERC UNIVAC AS SASD*BCHS-XX
C     (WHERE XX REPRESENTS A FIPS-CODE STATE), TOTAL/URBAN/RURAL
C     POPULATION, TOTAL/URBAN/RURAL OCCUPIED HOUSING, AND
C     TOTALS OF OCCUPIED HOUSING HEATED BY SEVERAL KINDS OF FUEL,
C     SUCH AS WOOD, OIL, COAL AND GAS.
C     HOUSING TOTALS OF SEVERAL KINDS OF FUELS, SUCH AS WOOD, OIL,
C     AND GAS.
C
C     THE COUNTS ARE USED AS SURROGATES FOR DISTRIBUTING POLLUTANT
C     EMISSION TOTALS THAT ARE KNOWN ONLY FOR AIR QUALITY CONTROL
C     REGIONS (MASSACHUSETTS) OR COUNTIES OR PARISHES (ALL OTHER STATES).
C
C     EACH STATE FILE CONSISTS OF ONE OR MORE TAPES AND IS ORGANIZED
C     INTO A HEAD SECTION AND A TAIL SECTION.
C
C     THE RECORDS IN THE HEAD SECTION ARE CLASSIFIED BY CENSUS
C     LEVEL: STATE (4), COUNTY OR PARISH (11), TOWNSHIP (12), PLACE
C     (13), TRACT (14), BLOCK (15), AND ELECTION DISTRICT (16).
C     NOTE THAT LEVELS 15 AND 16 ARE AT THE SAME LEVEL AND ARE
C     THEREFORE MUTUALLY EXCLUSIVE.
C
C     EMISSION TOTALS FOR GIVEN POLLUTANTS ARE USUALLY KNOWN FOR
C     ONLY THE COUNTY OR PARISH LEVEL (11).  THE POPULATION OR
C     HOUSING TOTAL ASSOCIATED WITH THE COUNTY OR PARISH
C     IS USED AS THE DENOMINATOR OF A FRACTION, THE NUMERATOR
C     OF WHICH IS ONE OF THE LOWER-LEVEL VALUES.  THE FRACTION
C     BECOMES AN ESTIMATE OF THE PROPORTION OF THE TOTAL EMISSION
C     FOR THE COUNTY OR PARISH THAT IS ASSOCIATED WITH THE GIVEN
C     SUBUNIT.  THUS, IF THE COUNTY IS BELIEVED TO EMIT 100 TONS
C     OF A POLLUTANT PER YEAR, AND THAT COUNTY HAS A POPULATION OF
C     100,000, THEN AN INCLUDED TRACT (LEVEL 14) THAT HAS A POPU-
C     LATION OF 50,000 WILL BE ASSUMED TO BE RESPONSIBLE FOR 50
```

```
C       TONS OF THE POLLUTANT PER YEAR, PROVIDED THAT POPULATION IS
C       SEEN AS A FAIR SURROGATE FOR THE ALLOCATION OF THE TOTAL
C       EMISSION.
C
C       THE PROGRAM ATTEMPTS TO SELECT THE HIGHEST CENSUS LEVEL
C       AVAILABLE IN A NESTING SERIES THAT MAY BEGIN WITH 12, 13, 14,
C       OR 15/16, AND EXTEND TO 15/16.  EACH SELECTED RECORD WILL
C       BE EXCLUSIVE OF ALL OTHERS.  AS SUGGESTED ABOVE, THE LOWEST POS-
C       SIBLE LEVEL IN ANY NESTING SERIES WILL BE 15 OR 16.  BUT THESE
C       TWO LEVELS THOUGH EXISTING WITHIN A SINGLE ENTITY ARE MUTUALLY
C       EXCLUSIVE.  FOR EXAMPLE, THE RECORD SEQUENCE FOR LEVELS,
C       13/15/15/16 MEANS THAT WITHIN THE LEVEL 13 ENTITY THERE ARE THREE
C       MUTUALLY-EXCLUSIVE SUBSETS.  TWO ARE LEVEL 15 AND ONE IS LEVEL
C       16.  THE SUM OF THE POPULATIONS OF THESE THREE SUBSETS IS EQUAL
C       TO THE POPULATION OF ENTITY 13.  THE LEVEL 16 RECORD IS NOT
C       CONTAINED WITHIN THE LEVEL 15 RECORD PRECEDING IT.
C
C       IT IS NECESSARY FOR THE PROGRAM TO KEEP CAREFUL TRACK OF WHICH
C       IS THE HIGHEST LEVEL IN THE 13-15/16 RANGE AT ANY TIME, IN
C       ORDER TO DETERMINE WHEN A NEW HIGH LEVEL IS ENCOUNTERED.  FOR
C       EXAMPLE IN THE SEQUENCE 12, 15, 16, 14, 15, 15 THE SECOND 14
C       WOULD BE IDENTIFIED AS A NEW HIGH.  HOWEVER IT CAN'T BE DETERM-
C       INED WHETHER IT IS A NEW HIGH UNLESS THE 16 BEFORE IT IS SAVED
C       FOR COMPARISON WITH IT.
C
C       EMISSION TOTALS FOR THE STATE OF MASSACHUSETTS ARE NOT
C       BY COUNTY OR PARISH, BUT RATHER BY THOSE PORTIONS OF THE
C       AIR QUALITY CONTROL REGIONS (AQCR'S) ENTIRELY WITHIN ITS
C       BORDERS.  EACH AQCR IS COMPOSED OF A SET OF TOWNSHIPS, ONE
C       LEVEL BELOW COUNTY, THAT MAY COME FROM ONE OR MORE COUN-
C       TIES.  WHEN RUN WITH THE MASTER CONTROL OPTION 'R', THE
C       PROGRAM SEEKS RECORDS FROM AN UPDATE FILE THAT INSTRUCTS
C       IT ON HOW TO ASSIGN THE VARIOUS TOWNSHIP RECORDS AS THEY
C       ARE ENCOUNTERED.  ACQR ACCUMULATORS FOR POPULATION AND
C       HOUSING ARE INCREMENTED ACCORDING TO THE ASSIGNMENTS OF
C       THE UPDATE FILE.  BY THIS PROCESS THE POPULATION AND
C       HOUSING TOTALS BY AQCR CAN BE DERIVED.  THE PROGRAM
C       REPLACES THE COUNTY RECORDS WITH RECORDS, GENERATED FROM
C       WITHIN THE PROGRAM, CONTAINING THESE TOTALS INCLUDED.
C
C       THE PROGRAM SAVES BOTH THE RECORDS REPRESENTING THE
C       EMISSION TOTALS (COUNTY, PARISH OR AQCR) AND THOSE RE-
C       QUIRED FOR ALLOCATING THE EMISSIONS (IN LEVELS 13-16).
C       A LATER PROGRAM (CREATE 5A) USES THESE RECORDS TO
C       CALCULATE ALLOCATION FACTORS.
C
C       IN THE CASE OF MASSACHUSETTS, PROGRAM CREATE 7B FIRST
C       READS THE FILE AND SORTS THE RECORDS BY A SPECIAL SORT
C       KEY THAT ASSURES THE AQCR RECORDS ARE IN FRONT OF THE
C       ALLOCATION RECORDS (LEVELS 13-16).  THIS IS NOT
C       NECESSARY FOR OTHER STATES AS THE COUNTY RECORDS
C       NORMALLY PRECEDE THE ALLOCATION RECORDS THAT ARE
C       SUBSET TO THEM.  WITH MASSACHUSETTS THE AQCR RECORDS
C       CANNOT BE SAVED UNTIL AFTER ALL TOWNSHIPS IN THE STATE
C       HAVE BEEN SCANNED.  THE GENERATED AQCR RECORDS ARE
C       SAVED AFTER THE PROCESSING OF THE FILE HEAD SECTION
C       IS COMPLETED.
C
C       THE VIRGINIA CENSUS FILE CONTAINS TWO BLOCKS OF RECORDS AT THE
C       SUMMARY LEVEL 11, NORMALLY RESERVED FOR ONLY COUNTIES:
C
C            0001 - 0199   COUNTIES
C            0510 - 0840   CITIES
C
C       THE POPULATION AND HOUSING COUNTS OF THE COUNTIES INCLUDE THE
C       CITY COUNTS.  THEREFORE, TO AVOID BOTH DOUBLE COUNTS AND ERRORS
```

```
C        WITH HASH TABLE REFERENCES, THE CITY RECORDS MUST BE SKIPPED.
C        IN POSITIONS 41-44 AND 46-49 OF THE CONTROL RECORD, THE USER
C        MAY SPECIFY THE RANGE OF FIPS CODENS TO BE PROCESSED.
C        THE RANGE SHOULD BE GIVEN AS 0001 0199.
C
C        UNDER ALL OPERATING CONDITIONS THE PROGRAM KEEPS TRACK
C        OF THE PROPORTIONS OF SAVED ALLOCATION RECORDS THAT
C        FOR A GIVEN TOWNSHIP HAVE SUPPRESSED OCCUPIED HOUSING
C        TOTAL RECORDS.  THOSE WITH FRACTIONS OVER A CRITICAL
C        VALUE (BY DEFAULT, 10%) ARE FLAGGED.  THE USER MAY
C        CHOOSE TO REPLACE ALLOCATION RECORDS WITH TOWNSHIP
C        OR COUNTY RECORDS FOR ALLOCATING PURPOSES IF SUPPRESSIONS
C        OF OCCUPIED HOUSING CREATE MORE PROBLEMS FOR ALLOCA-
C        TION THAT RESORTING TO HIGHER-LEVEL RECORDS, WITH
C        LESS RESOLUTION TO OFFER, MIGHT CAUSE.  IF SUPPRESSION ONLY
C        IS A PROBLEM, THE MASTER CONTROL OPTION 'S' IS CHOSEN.
C
C        IF THERE IS A NEED TO REPLACE COUNTIES WITH AQCRS OR
C        THEIR EQUIVALENT AND AT THE SAME TIME ONE MUST
C        CONSIDER AND DEAL WITH EXCESSIVE SUPPRESSION
C        OF OCCUPIED HOUSING COUNTS, THE MASTER CONTROL OPTION
C        'B' (FOR 'BOTH') SHOULD BE SELECTED.  IT IS NOT PRES-
C        ENTLY KNOWN WHETHER MASSACHUSETS OR A PART THEREOF WILL
C        FALL INTO THIS CATEGORY.
C
C        IT WAS INDICATED ABOVE THAT EITHER THE COUNTY (11) OR
C        TOWNSHIP (12) RECORD MAY REPLACE THE ALLOCATION RECORD
C        THAT HAS EXCESSIVE SUPPRESSION.  HOWEVER ONE OF THESE
C        CAN BE SPECIFIED ONLY WHEN THE 'X' MASTER CONTROL OP-
C        TION IS GIVEN.  THAT OPTION CALLS FOR A SPECIAL RECORD
C        IN THE CONTROL FILE, FOLLOWING THE REGULAR ONE, IN WHICH
C        SEVERAL PARAMETERS MUST BE EXPLICITLY DEFINED, INCLUDING
C        THE REPLACEMENT VARIABLE 'REPL'.  WHEN 11 OR 12 IS
C        GIVEN IN THE 'REPL' FIELD OF THAT RECORD, THE COUNTY
C        OR TOWNSHIP RECORD FOR ALL TOWNSHIPS IN THE STATE MUST
C        BE USED AS ALLOCATION RECORDS.  WHEN A ZERO OR BLANK
C        FIELD IS SPECIFIED, OR WHEN THE MASTER CONTROL OPTION
C        IS 'S' OR 'B', PROGRAM 7B SHOULD SELECT THE LEVEL
C        ABOVE THE IHIGH-LOWL RANGE (11-(IHIGH-1)) THAT IS
C        UNSUPPRESSED, UNLESS A HIGHER LEVEL THAT INCLUDES
C        IT HAS ALREADY BEEN SELECTED, IN WHICH CASE
C        NO NEW SELECTION IS MADE, AS ALL SELECTIONS
C        MUST BE MUTUALLY EXCLUSIVE.
C
C        FOR THE PURPOSE OF ANALYZING PROGRAM CORRECTNESS
C        AND PROMOTING USER UNDERSTANDING, SEVERAL ANALYSIS OPTIONS
C        ARE AVAILABLE.  THEY HAVE THE FOLLOWING EFFECTS:
C
C           LIST   LISTS VALUES OF DATA ELEMENTS ABSTRACTED
C                  FROM EACH OF THE FIRST LMAX CENSUS REC-
C                  ORDS.  LISTS VALUES OF DATA ELEMENTS OF
C                  EACH RECORD SAVED WITHIN THE RANGE OF THE
C                  FIRST LMAX RECORDS READ.
C
C           TEST   PERMITS PRINTOUT OF ALL SUPPRESSION RECORDS.
C                  (NOTE:  SUPPRESSION RECORDS WITH WARNING FLAGS
C                  ARE ALWAYS PRINTED.)
C
C           DEBUG  LISTS VALUES IN THE NUMAQR ARRAY FOR EACH OF THE
C                  FIRST LMAX RECORDS READ.  DISPLAYS UP TO LMAX
C                  VALUES OF PARAMETERS ON ENTRY TO THE 'CATEG', 'SUM',
C                  'OPTIONS' AND 'OUTPUT' SUBROUTINES.  DISPLAYS
C                  INPUT AND OUTPUT VALUES OF THE 'NEDS' SUB-
C                  ROUTINE AS INVOKED BY RECORDS IN THE LMAX
C                  RANGE.
C
```

```
C
C
C     VERSION CREATE7A-C DIFFERS FROM CREATE7A-B IN PROVIDING
C     ADDITIONAL ANNOTATION, IN ELIMINATING A 'DEBUG' SCREEN-
C     ING BUG IN SUBROUTINE 'OUTPUT', IN ASSURING A SKIP TO A
C     NEW PAGE FOR EACH STATE, AND IN PROVIDING ADDITIONAL
C     DATE/TIME CHECKS BETWEEN STATES AND AT THE END OF PROC-
C     ESSING.
C
C     VERSIONS B AND C ARE BOTH FUNCTIONAL.  OUTPUT FROM EITHER,
C     PROVIDED B IS RUN WITH THE DEBUG OPTION AND UNDER CONDITIONS
C     WHERE ONLY IUPD=0 IS APPROPRIATE, IS FULLY ACCEPTABLE.
C      IN THE 'MSG' FILE THE LAST LINE OF OUTPUT IS:
C
C            *****  PROGRAM TERMINATED NORMALLY  *****
C-----------------------------------------------------------------------
C
C     THIS PROGRAM REQUIRES THE FOLLOWING INPUT FILES:
C
C        ICEN     11    CENSUS FILE (1 OR MORE TAPES PER STATE)
C                       PRESENT EXTERNAL NAME IS 'SASD*BCHS-XX',
C                       WHERE XX IS FIPS STATE CODE NUMBER
C                       (DELAWARE IS 10, FOR EXAMPLE).
C        IHASH     9    HASH TABLE ALLOWING FIPS TO NEDS TRANSLATIONS
C                       OF THE STATE AND COUNTY CODES.
C                       PRESENT EXTERNAL NAME IS 'FMS*FIPS-NEDS-H'.
C        IAQ      10    SPECIAL EMISSION UNIT DEFINITION FILE.
C                       REQUIRED FOR THE STATE OF MASSACHUSETTS,
C                       WHICH USES MODIFIED AIR QUALITY CONTROL
C                       REGIONS (AQCR'S) INSTEAD OF COUNTIES.
C                       PRESENT EXTERNAL NAME IS 'ACID*UPDATE.'
C        IPARM     5    ANALYSIS/CONTROL FILE.
C                       PRESENT EXTERNAL NAME IS 'ACID*CONTROL7A'.
C                       BEGINS WITH 0-3 DEBUGGING/LISTING/TESTING
C                       ANALYSES FOLLOWED BY AN 'END' RECORD.
C                       EXAMPLE:
C                       LIST
C                       DEBUG
C                       END
C
C                       THE 'END' RECORD MUST ALWAYS BE PRESENT.
C
C                       AFTER THE END RECORD FOLLOWS A CONTROL RECORD
C                       (ONE OR MORE) AS DESCRIBED IN SUBROUTINE KNTROL.
C                       AN EXAMPLE:
C                               10 11 N 80 1 01
C
C                       IN THIS EXAMPLE, THE REQUEST IS FOR THE PROCES-
C                       SING OF DELAWARE (FIPS CODE 10) THROUGH TO THE
C                       DISTRICT OF COLUMBIA (FIPS CODE 11).  PROCES-
C                       SING IS NORMAL (N), INDICATING THAT SPECIAL
C                       EMISSION TOTAL UNITS NEED NOT BE FORMED (AS
C                       THEY MUST BE FOR MASSACHUSETTS), SUPPRESSION
C                       COUNTS FOR OCCUPIED HOUSING DO NOT HAVE TO BE
C                       RECOGNIZED, AND THE HIGHEST LEVEL AT WHICH TO
C                       SEEK AN ALLOCATION RECORD IS 13 (INSTEAD OF
C                       12, 14 OR 15).  ALL STATES EXCEPT MASSACHUS-
C                       ETTS CAN BE PROCESSED THIS WAY--AT LEAST
C                       INITIALLY.  TEXAS, CALIFORNIA, NEW YORK,
C                       FLORIDA, ILLINOIS, AND NEW JERSEY ARE AMONG
C                       THE STATES THAT MIGHT REQUIRE REPROCESSING IN
C                       RECOGNITION OF EXCESSIVE SUPPRESSION COUNTS,
C                       BUT THEN ONLY IF OCCUPIED HOUSING COUNTS ARE
C                       THOUGHT TO BE IMPORTANT AS SURROGATES.
C                       MASTER CONTROL CODE 'S' MAY BE THE APPROPRIATE
C                       CODE TO REPLACE 'N'.  THE YEAR FOR THE CENSUS
```

```
C                      DATA IS 1980 (80), ONE FILE PER STATE IS EX-
C                      PECTED ('1'), AND THE NUMBER OF DIAGNOSTIC
C                      REPORTS TO PROVIDE PER STATE IS 1 ('01').  BY
C                      DEFAULT A CRITICAL RATIO FOR RECOGNITION OF EX-
C                      CESSIVE SUPPRESSIONS IS .10 & THE MAXIMUM NO.
C                      OF RECORDS TO PROCESS PER STATE IS 2,000,000.
C
C     THIS PROGRAM REQUIRES THE FOLLOWING OUTPUT FILES:
C
C          -       6   NORMAL OPERATING SYSTEM MESSAGES AND SOME
C                      PROGRAM MSSAGES.  IT IS DIRECTED TO AN EXTERNAL
C                      FILE UNDER THE NAME 'ACID*MESSAGE.'  ITS LENGTH
C                      IS USUALLY UNDER 30 RECORDS ('LINES').
C        MSG       4   NORMAL PROGRAM MESSAGE AND SUMMARY PRINTOUTS.
C                      IT IS DIRECTED TO AN EXTERNAL FILE UNDER THE NAME
C                      'ACID*MSG7A.'  MOST OF THE DIAGNOSTIC INFORMATION
C                      HERE.  ITS LENGTH IS ABOUT 600 RECORDS ('LINES')
C                      PER STATE WHEN 10 DIAGNOSTIC RECORDS ARE PRINTED.
C        ISUP      8   SUPPRESSION STATISTICS FILE.
C                      USED TO DETERMINE WHETHER A PARTICULAR
C                      EMISSION TOTAL UNIT (COUNTY OR AQCR) HAS
C                      AN EXCESSIVE FRACTION OF SUPPRESSED COUNTS
C                      AT THE CENSUS LEVELS (13-16) NORMALLY
C                      USED AS SURROGATES FOR EMISSION ALLOCA-
C                      TION.  SEE WARNING SUBROUTINE KNTROL.
C                      PRESENT EXTERNAL NAME IS 'ACID*DCFLAG'.
C        IOUT     12   ALLOCATION FILE.
C                      RECEIVES EMISSION UNIT TOTAL AND SUR-
C                      ROGATE ALLOCATION UNIT RECORDS THAT
C                      HAVE BEEN SCREENED OR CREATED BY THE
C                      PROGRAM.
C                      PRESENT EXTERNAL NAME IS 'ACID*DCOUT.'
C
C     FILES IPARM, IHASH, ISUP AND IOUT ARE USED BY PROGRAM CREATE7B.
C     FILE IOUT IS USED BY PROGRAM CREATE5A, WHICH UNDER VERY UNUSUAL
C     CIRCUMSTANCES MIGHT REQUIRE FILE IHASH AS WELL.
C
C--------------------------------------------------------------------------
C
      COMMON/DEBUG/LIST,TEST,DEBUG
      COMMON/DEVICE/MSG,IPARM,ISUP,IAQ,ICEN,IOUT,IHASH
      COMMON/INDEX/NT,LH,IAL,ISEQ,NTL,IDMAX,ISAVE,NSTATE,CRIT,
     * NUMREC,NUMTAP,MAX,NUMAQR(16)
      COMMON/PARMS/IDSTAT,NTAPE,IUPD,ISUML,IREPL,IHIGHL,LOWL
      COMMON/LOG/UEOF,TAPOK
      COMMON/PREV/NPCL,NP4,NP11,NP12
C
      LOGICAL LIST,TEST,DEBUG
      LOGICAL UEOF,TAPOK
      INTEGER NTWP(100)
      CHARACTER   FREE*16,FN*2,ASG*17,USE*19,B*4,T*6
      CHARACTER*6 OPTION
      CHARACTER   DATE*8,TIME*8,AYR*2,LABEL*10
      INTEGER FACSF2
      DATA  FREE /'@FREE SASD*BCHS-'/
      DATA ASG /'@ASG,A SASD*BCHS-'/
      DATA USE /'@USE 11.,SASD*BCHS-'/
      DATA  B /'. . '/
      DATA  T /'.,T . '/
C--------------------------------------------------------------------------
C
C*****PROVIDE LABEL FOR THIS VERSION OF CREATE 7A:
      LABEL-'CREATE7A-K'
C
C--------------------------------------------------------------------------
C
```

```
C                  I/O FILES
C                  _________
C
C*****FILE FOR NORMAL PRINTOUT (OPEN: MAIN)
         MSG    =  4
C*****FILE FOR CONTROL RECORDS (OPEN: MAIN.  READ: MAIN, KNTROL)
         IPARM  =  5
C*****SUPPRESSION STATISTICS FILE (OPEN: GETFILE.  WRITE: ALLOC)
         ISUP   =  8
C*****HASH TABLE WITH FIPS TO NEDS TRANSLATION INDEX (READ: NEDS)
         IHASH  =  9
C*****AQCR DEFINITION FILE (OPEN: GETFILE.  READ: UPDATE)
         IAQ    = 10
C*****CENSUS FILE (OPEN: GETFILE.  READ: INPUT)
         ICEN   = 11
C*****ALLOCATION FILE (OPEN: GETFILE.  WRITE: OUTPUT, TAIL)
         IOUT   = 12
C
C         ... GET DATE AND TIME.  PRINT HEADER.
C
          CALL ADATE (DATE,TIME)
          WRITE (MSG,9130) LABEL,DATE,TIME
C
         OPEN (MSG,STATUS='NEW',ACCESS='SEQ',FORM='FORMATTED',
     *   FILE='MSG7A')
C
C        ... OPEN CONTROL FILE (INPUT)
         OPEN (IPARM,STATUS='OLD',ACCESS='SEQ',FORM='FORMATTED',
     *   FILE='CONTROL7A')
C
C        ... DEFINE DIAGNOSTIC OPTION FLAGS WITH DEFAULT VALUES.
         LIST   = .FALSE.
         TEST   = .FALSE.
         DEBUG =  .FALSE.
C
C        ...GET DIAGNOSTIC PROCESSING OPTIONS AND SET FLAGS ACCORDINGLY.
  200    READ (IPARM,9110) OPTION
         IF (OPTION.EQ.'END') GO TO 300
         IF (OPTION.EQ.'LIST') THEN
            LIST=.TRUE.
            WRITE (MSG,9140) OPTION
            GO TO 200
         ENDIF
         IF (OPTION.EQ.'TEST') THEN
            TEST=.TRUE.
            WRITE (MSG,9140) OPTION
            GO TO 200
         ENDIF
         IF (OPTION.EQ.'DEBUG') THEN
            DEBUG=.TRUE.
            WRITE (MSG,9140) OPTION
            GO TO 200
         ENDIF
C
C        ... INITIALIZE COUNTERS OF TOTAL RECORDS AND TOTAL STATES
  300    NUMREC = 0
         NSTATE = 0
C
C        ... MAIN LOOP FOR EACH STATE BLOCK.
C
C         ... INITIALIZE VARIABLES THAT SHOULD NOT BE REINITIALIZED AFTER
C             EACH STATE.
         CALL RENUM (0,1,16)
         ISAVE=0
         LEVLAQ=0
         AQNAME=' '
```

```
C      ... OBTAIN CONTROL INFORMATION FOR BLOCK OF ONE MORE STATES
C          AND SCREEN TO ASSURE VALUES ARE ALLOWED.
500   CALL KNTROL (NFST,NLST,AYR,LMAX,MINCDE,MAXCDE)
C     ...ASSIGN NUMBER OF NEXT FILE (STATE) TO STRING VARIABLE 'FN'.
C         (NOTE: FILE WILL CONSIST OF ONE OR MORE TAPES.)
600   WRITE (FN,9505) IDSTAT
      WRITE (MSG,9610)
9610  FORMAT ('1')
      WRITE (MSG,9130) LABEL,DATE,TIME
C     ...ASSIGN AND USE CURRENT FILE (STATE) IN BLOCK.
      CALL FACSF (ASG//FN//T)
      KASG-FACSF2 (ASG//FN//T)
      WRITE (6,9506) ASG//FN
      IF (KASG.LT.0) GO TO 800
      WRITE (MSG,9805) ASG//FN//T
9805  FORMAT (10X,A25)
      CALL FACSF (USE//FN//B)
      KUSE-FACSF2 (USE//FN//B)
      WRITE (6,9506) USE//FN
      IF (KUSE.LT.0) GO TO 810
      WRITE (MSG,9815) USE//FN//B
9815  FORMAT (10X,A25)
C     ...OPEN NEW CENSUS FILE (STATE)
      OPEN (ICEN,STATUS-'OLD',TYPE-'ANSI',RFORM-'F',
     *       BLOCK-12096,MRECL-12096,IOSTAT-NIX,ERR-820)
C     ... INITIALIZE DATA FOR CURRENT STATE IN BLOCK
      CALL SETUP
C     ... INCREMENT COUNTER OF STATES PROCESSED IN BLOCK
      NSTATE-NSTATE+1
C     ...PROCESS CENSUS FILE OF STATE IDSTAT IN RANGE NFST-NLST
      IALL-0
      CALL INPUT (AYR,LMAX,DATE,TIME,IALL,NSUP,LABEL,NTWP,NASUM,
     *             MINCDE,MAXCDE)
C     ...CLOSE CURRENT CENSUS FILE (STATE)
      CLOSE (ICEN)
C     ...FREE TAPE(S) OF CURRENT CENSUS FILE (STATE)
      CALL FACSF (FREE//FN//B)
      KFREE-FACSF2 (FREE//FN//B)
      WRITE (6,9506) FREE//FN
      IF (KFREE.LT.0) THEN
         WRITE (MSG,9611) KFREE
         CALL ABEND (MSG)
      ENDIF
C     ...ADD TAPE MARKS TO THE CURRENT OUTPUT FILES FOR THE STATE.
C        FIRST WRITE A TERMINATOR RECORD FOR THE STATE IN THE
C        SUPPRESSION FILE.
      ENDFILE IOUT
      WRITE (ISUP) NP4,9999,9999,' ',NSUP,.0,LABEL
      NSUP-0
      ENDFILE ISUP
C     ...PROCESS CENSUS FILE OF NEXT STATE IDSTAT IN RANGE NFST-NLST.
      IF (IDSTAT.EQ.NLST) GO TO 500
      IDSTAT-IDSTAT+1
      GOTO 600
C     ... PRINT ERROR MESSAGE FOR 'ASG' OR 'USE' ECL STATEMENT
C         ASSOCIATED WITH STATE 'FN'.
800   WRITE (MSG,9800) FN
      CALL ABEND (MSG)
810   WRITE (MSG,9810) FN
      CALL ABEND (MSG)
C     ... PRINT ERROR MESSAGE ASSOCIATED WITH OPENING OF CENSUS
C         FILE OF STATE 'FN'.
820   WRITE (MSG,9820) FN
      CALL ABEND (MSG)
C
C-----------------------------------------------------------------
```

```
C
9110  FORMAT(A6)
9120  FORMAT (F10.0)
9130  FORMAT(1H ,20X,'ACID RAIN RMDHS SUPPORT'//
     *            24X,A10,' PROGRAM'///
     *            24X,A8,3X,A8//
     * 10X,'CONTROL OPTIONS IN EFFECT: '//)
9140  FORMAT (12X,A6)
9505  FORMAT (J2)
9506  FORMAT (1X,A30)
9611  FORMAT (//10X,'ERROR IN INTERPRETATION OF FREE STATEMENT'/
     *            10X,'STATUS CODE IS ',I12///)
9800  FORMAT (/10X,'ERROR IN ASSIGNMENT OF FILE ',A2///)
9810  FORMAT (/10X,'ERROR IN USE OF FILE ',A2///)
9820  FORMAT (/10X,'ERROR IN OPENING OF NEW CENSUS FILE ',A2///)
C
      END
C***********************************************************************
C
      SUBROUTINE KNTROL (NFST,NLST,AYR,LMAX,MINCDE,MAXCDE)
C
C     ...READ CONTROL DATA FOR EACH STATE.
C
C***********************************************************************
C
      COMMON/DEBUG/LIST,TEST,DEBUG
      COMMON/DEVICE/MSG,IPARM,ISUP,IAQ,ICEN,IOUT,IHASH
      COMMON/INDEX/NT,LH,IAL,ISEQ,NTL,IDMAX,ISAVE,NSTATE,CRIT,
     *  NUMREC,NUMTAP,MAX,NUMAQR(16)
      COMMON/PARMS/IDSTAT,NTAPE,IUPD,ISUML,IREPL,IHIGHL,LOWL
      COMMON/LOG/UEOF,TAPOK
C
      LOGICAL LIST,TEST,DEBUG
      LOGICAL UEOF,TAPOK
      CHARACTER ABR*2,CNTL*1,RECORD*80,AYR*2
C-----------------------------------------------------------------------
C
C     ...READ CONTROL PARAMETERS FOR INCLUSIVE SERIES OF STATES.
C
C     ***** WARNING:  UPDATE @MOVE STATEMENTS IN THE RUNSTREAM EACH
C           TIME THE PROGRAM IS RUN TO AVOID OVERWRITING PREVIOUS
C           FILES.  THE @MOVE NUMBER PARAMETER SHOULD ORDINARILY BE
C           THE OUTPUT FILE NUMBER OF THE LAST STATE STORED ON TAPE.
C           SEE LIST BELOW.
C
C     THE PROCESSING OF MASSACHUSETTS REQUIRES THAT CREATE7A OUTPUT
C     BE DIRECTED TO AN INTERMEDIATE FILE.  THE OUTPUT OF CREATE7B
C     SHOULD BE SUBSTITUTED FOR THAT OF CREATE7A ON THE OUTPUT TAPE.
C
C       ABR    A2    1-2   PROCESSING CODE
C                              ST      STOP PROCESSING
C                            (OTHER)   CONTINUE PROCESSING
C       NFST   I2    9-10  FIRST STATE IN INCLUSIVE SERIES
C                          FIPS CODES TO BE USED ARE GIVEN BELOW.
C       NLST   I2   12-13  LAST STATE IN INCLUSIVE SERIES
C                          (NOTE: IF BLANK, WILL PROCESS ONLY
C                           STATE GIVEN AS NFST)
C       CNTL   A1    15    MASTER CONTROL
C                             N    NORMAL: NO RECLASSIFICATION OF
C                                  EMISSION TOTAL UNITS OR SUPRESSION
C                                  OVERRIDE REQUIREMENTS
C                             R    RECLASSIFICATION ONLY (E.G., MASS.)
C                             B    RECLASSIFICATION AND SUPPRESSION
C                                  OVERRIDE
C                             S    SUPPRESSION OVERRIDE ONLY
C                             X    REPLACE ONE OR MORE DEFAULTS FOR
```

```
C                                            ISUML (0), IREPL (0), IHIGHL (13),
C                                            LOWL (16).  ALSO GIVE IUPD (0-3).
C          AYR    A2    17-18  CENSUS YEAR (LAST TWO DIGITS)
C          NTAPE  I1     20    MAXIMUM NUMBER OF FILES EXPECTED PER
C                              STATE.  IT IS BELIEVED THAT ALL 1980
C                              TAPES FOR ANY ONE STATE WERE SET
C                              UP AS PART OF ONE FILE.  THEREFORE
C                              NTAPE SHOULD BE SET TO 1.
C          LMAX   I2    22-23  NUMBER OF INPUT RECORDS PER STATE FOR
C                              WHICH TO DISPLAY DIAGNOSTIC INFORMATION.
C                                RANGE IS 0 TO 99.
C                                EACH DIAGNOSIS REQUIRES 31 TO 92 LINES.
C          MAX    I10   25-34  NUMBER OF INPUT RECORDS TO PROCESS PER
C                              STATE.
C                                DEFAULT:   2,000,000
C
C          CRIT   F4.0  36-39  CRITICAL VALUE FOR SUPPRESSION.
C                                 RANGE:  .001 TO 1.00
C                                 DEFAULT:  .10
C                              IF SUPPRESSION FRACTION FOR THE TOTAL OF
C                              OCCUPIED HOUSING IN A GIVEN COUNTY OR
C                              PARISH OR AQCR EXCEEDS 'CRIT', A WARNING
C                              FLAG ('***') WILL BE PLACED IN THE COR-
C                              RESPONDING SUPPRESSION FILE RECORD.  SEE
C                              SUBROUTINE 'ALLOC' AND FILE 'DCFLAG'.
C          MINCDE I4    41-44  MINIMUM VALUE FOR FIPS CODE (IF BLANK,
C                              VALUE IS SET TO 1)
C          MAXCDE I4    46-49  MAXIMUM VALUE FOR FIPS CODE (IF BLANK,
C                              VALUE IS SET TO 9999)
C
C     TAPE OUTPUT FILE NUMBER AND STATE FIPS CODE FOR EACH STATE ARE
C     AS FOLLOWS:
C
C    OUTPUT                    OUTPUT                     OUTPUT
C     FILE FIPS  STATE          FILE FIPS  STATE           FILE FIPS  STATE
C       1   01 ALABAMA           16   21 KENTUCKY           33   38 NORTH DAKOTA
C       *   02 ALASKA            17   22 LOUISIANA          34   39 OHIO
C       2   04 ARIZONA           18   23 MAINE              35   40 OKLAHOMA
C       3   05 ARKANSAS          19   24 MARYLAND           36   41 OREGON
C       4   06 CALIFORNIA        20   25 MASSACHUSETTS      37   42 PENNSYLVANIA
C       5   08 COLORADO          21   26 MICHIGAN           38   44 RHODE ISLAND
C       6   09 CONNECTICUT       22   27 MINNESOTA          39   45 SOUTH CAROLINA
C       7   10 DELAWARE          23   28 MISSISSIPPI        40   46 SOUTH DAKOTA
C       8   11 DIST. OF COL.     24   29 MISSOURI           41   47 TENNESSEE
C       9   12 FLORIDA           25   30 MONTANA            42   48 TEXAS
C      10   13 GEORGIA           26   31 NEBRASKA           43   49 UTAH
C       *   15 HAWAII            27   32 NEVADA             44   50 VERMONT
C      11   16 IDAHO             28   33 NEW HAMPSHIRE      45   51 VIRGINIA
C      12   17 ILLINOIS          29   34 NEW JERSEY         46   53 WASHINGTON
C      13   18 INDIANA           30   35 NEW MEXICO         47   54 WEST VIRGINIA
C      14   19 IOWA              31   36 NEW YORK           48   55 WISCONSIN
C      15   20 KANSAS            32   37 NORTH CAROLINA     49   56 WYOMING
C                                                            *   72 PUERTO RICO
C
C     * ALASKA, HAWAII, AND PUERTO RICO ARE NOT TO BE PROCESSED
C       IN THE NAPAPS PROGRAM.  AFTER COMPLETION, THERE SHOULD
C       BE FORTY-NINE FILES ON EACH OUTPUT TAPE.  THE FIRST FILE
C       SHOULD BE ALABAMA, THE ELEVENTH SHOULD BE IDAHO, AND
C       THE FORTY-NINTH SHOULD BE WYOMING.
C
C       MASSACHUSETTS SHOULD BE RUN THROUGH CREATE7A WITH THE
C       FOLLOWING OUTPUT FILES:
C              DCFLAG       MASS STORAGE DISK FILE
C              DCOUT        MASS STORAGE DISK FILE
C       IT SHOULD THEN BE RUN THROUGH CREATE7B WITH THE FOLLOWING
C       OUTPUT FILE:
```

```
C              DCOUT      SYSTEM TAPE 007603
C                         (FILE 20 - USE @MOVE DCOUT.,19)
C
C       A SPECIAL RUN-STREAM FILE (ACID*RUN.MAMA) SHOULD BE SET
C       UP TO PROCESS MASSACHUSETTS DATA IN ONE RUN THROUGH BOTH
C       PROGRAMS.
C
C---------------------------------------------------------------------------
C
C
      READ (IPARM,9500,ERR-600,END-800) ABR,NFST,NLST,CNTL,AYR,
     *                                  NTAPE,LMAX,MAX,CRIT,
     *                                  MINCDE,MAXCDE,RECORD
C     ...PRINT IMAGE OF CONTROL RECORD
      WRITE (MSG,9510) RECORD
C
C     ...CHECK FOR END OF CONTROL FILE
      IF (ABR .EQ. 'ST') GO TO 700
C     ...CHECK NFST TO NLST ORDER, RANGE, AND DEFAULTING
      IF (NLST.EQ.0) NLST-NFST
      IF ((NFST.LE.0).OR.(NFST.GT.NLST).OR.(NLST.LT.0).OR.(NFST.GT.99)
     *    .OR.(NLST.GT.99)) GO TO 400
C     ...CHOOSE DEFAULT VALUE FOR MAXIMUM NUMBER OF RECORDS TO READ
C        IF MAX FIELD IS BLANK OR ZERO OR LESS THAN ZERO.
         IF (MAX.LE.0) MAX-2000000
C     ...CHOOSE DEFAULT FOR CRITICAL VALUE IF CRIT FIELD IS BLANK
C        OR ZERO OR LESS THAN ZERO.
      IF (CRIT.LE.0.) CRIT-.100
C
C      ...PRINT INTERPRETATION OF CONTROL RECORD.
       WRITE (MSG,9520) ABR,NFST,NLST,CNTL,AYR,NTAPE,LMAX,MAX,
     *                  MINCDE,MAXCDE
C     ...SET UP MASTER CONTROL LEVELS
      ISUML-0
      IREPL-0
      IHIGHL-13
      LOWL-16
      IDSTAT-NFST
      IF (CNTL .EQ. 'N') THEN
        IUPD-0
      ELSEIF (CNTL .EQ. 'R') THEN
        IUPD-1
        IREPL-11
        ISUML-12
      ELSEIF (CNTL .EQ. 'B') THEN
        IUPD-2
        IREPL-11
        ISUML-12
      ELSEIF (CNTL .EQ. 'S') THEN
        IUPD-3
        IREPL-11
        ISUML-12
      ELSEIF (CNTL .EQ. 'X') THEN
        READ(IPARM,9530,ERR-600,END-800) IUPD,ISUML,IREPL,IHIGHL,LOWL
      ELSE
        WRITE (MSG,9540) CNTL
        CALL ABEND (MSG)
      ENDIF
C
      WRITE (MSG,9550) IUPD,ISUML,IREPL,IHIGHL,LOWL
C
C     ... SCREEN CONTROL PARAMETERS FOR INVALID DATA.
      CALL CHPARM
C
C     ... SET EMISSION TOTAL LEVEL FOR ALL STATES INVOLVED
      IF (IREPL .EQ. 0) THEN
```

```
        NTL - 11
      ELSE
        NTL - IREPL
      ENDIF
C
C     ... OPEN AIR QUALITY CONTROL REGION (AQCR) FILE FOR STATE(S)
C         IF REQUIRED.  SET FLAG.
      IF ((IUPD.EQ.0).OR.(IUPD.EQ.3)) THEN
        UEOF - .TRUE.
      ELSE
C       ... OPEN UPDATE FILE AND READ FIRST RECORD
        UEOF - .FALSE.
        CALL GETFIL ('AQCRFL')
        CALL UPDATE
      ENDIF
C
C     ... OPEN CENSUS, FLAG AND OUTPUT FILES FOR STATE
      CALL GETFIL ('FLAGFL')
      CALL GETFIL ('OUTPUT')
C
      RETURN
400   WRITE (MSG,9400)
      CALL ABEND (MSG)
C
600   WRITE (MSG,9600)
      CALL ABEND (MSG)
C
700   WRITE (MSG,9700) NSTATE,NUMREC
      CALL TERM (MSG)
C
800   WRITE (MSG,9800) NSTATE,NUMREC
      CALL ABEND (MSG)
C-----------------------------------------------------------------------
9400  FORMAT (10X,'STATE CODES OUT OF ORDER OR RANGE.'///)
9500  FORMAT(A2,3X,3X,I2,1X,I2,1X,A1,1X,A2,1X,I1,1X,I2,1X,I10,1X,F4.0,
     *       1X,I4,1X,I4,T1,A80)
9510  FORMAT (/10X,'CONTROL RECORD IMAGE: ->',1X,A80)
9520  FORMAT (/10X,'INTERPRETATION: '/
     *         10X,'PROCESSING CODE..........',A2/
     *         10X,'FIRST STATE IN SERIES....',I2/
     *         10X,'LAST STATE IN SERIES.....',I2/
     *         10X,'MASTER CONTROL CODE.......',A1/
     *         10X,'CENSUS YEAR..............',A2/
     *         10X,'TAPES PER STATE, MAX.....',I2/
     *         10X,'RECORDS TO DIAGNOSE......',I2/
     *         10X,'RECORDS TO PROCESS.',I8/
     *         10X,'MINIMUM FIPS CODE .....',J4/
     *         10X,'MAXIMUM FIPS CODE .....',J4)
9530  FORMAT(5I5)
9540  FORMAT(/10X,'ERROR: INVALID CONTROL PARAMETER ---> ',A1/)
9550  FORMAT (/10X,'GENERATED OR DEFAULT VALUES'/
     *          10X,'-----------------------------'/
     * 10X,'IUPD    - ',I2/
     * 10X,'ISUML   - ',I2/
     * 10X,'IREPL   - ',I2/
     * 10X,'IHIGHL  - ',I2/
     * 10X,'LOWL    - ',I2/)
9600  FORMAT(//10X,'ERROR READING CONTROL FILE'/)
9700  FORMAT(//10X,60('-')/
     * 10X,'NORMAL END OF PROGRAM CALLED BY CONTROL FILE'/
     * 15X,'STATES PROCESSED  - ',I10/
     * 15X,'RECORDS PROCESSED - ',I10/
     * 10X,60('-')/)
9800  FORMAT(//10X,60('!')/
     * 10X,'ERROR: EOF REACHED ON CONTROL FILE'/
     * 15X,'STATES PROCESSED  - ',I10/
     * 15X,'RECORDS PROCESSED - ',I10/
     * 10X,60('!')/)
C
      END
C***********************************************************************
C
      SUBROUTINE CHPARM
C     ... SCREEN CONTROL PARAMETERS FOR INVALID DATA
C
C***********************************************************************
C
      COMMON/DEBUG/LIST,TEST,DEBUG
      COMMON/DEVICE/MSG,IPARM,ISUP,IAQ,ICEN,IOUT,IHASH
      COMMON/PARMS/IDSTAT,NTAPE,IUPD,ISUML,IREPL,IHIGHL,LOWL
C
      LOGICAL LIST,TEST,DEBUG
C-----------------------------------------------------------------------
C
      IF (NTAPE .LE. 0 .OR. NTAPE .GT. 9) CALL ERROR(1)
      IF (ISUML .NE. 0  .AND.
     * (ISUML .LT. IREPL .OR. ISUML .GT. 12)) CALL ERROR(2)
      IF (IREPL .NE. 0 .AND. IREPL .NE. 11  .AND.
     * IREPL .NE. 12) CALL ERROR(4)
      IF (IUPD .LT. 0 .OR. IUPD .GT. 3) CALL ERROR(5)
      IF (IHIGHL .LT. 12 .OR. IHIGHL .GT. 15) CALL ERROR(6)
      IF (LOWL .LT. IHIGHL .OR. LOWL .GT. 16) CALL ERROR(7)
C
      RETURN
      END
C***********************************************************************
C
      SUBROUTINE ERROR(NUMERR)
C     ... WRITE ERROR MESSAGES TO OUTPUT FOR CONTROL ERRORS
C
C***********************************************************************
C
      COMMON/DEBUG/LIST,TEST,DEBUG
      COMMON/DEVICE/MSG,IPARM,ISUP,IAQ,ICEN,IOUT,IHASH
      COMMON/PARMS/IDSTAT,NTAPE,IUPD,ISUML,IREPL,IHIGHL,LOWL
C
      DIMENSION IVAL(7)
      LOGICAL LIST,TEST,DEBUG
      CHARACTER*6 VNAME(7)
C
      EQUIVALENCE (IVAL(1),NTAPE)
C
      DATA VNAME/'NTAPE','ISUML ','IFL   ','IREPL ',
     * 'IUPD  ','IHIGHL','LOWL '/
C-----------------------------------------------------------------------
C
C     (NOTE:  IFL NO LONGER USED)
C
      WRITE (MSG,510)
      WRITE (MSG,520) VNAME(NUMERR),IVAL(NUMERR)
      IF (NUMERR .EQ. 2) WRITE(MSG,520) VNAME(4),IVAL(4)
      IF (NUMERR .EQ. 6) WRITE (MSG,520) VNAME(7),IVAL(7)
      IF (NUMERR .EQ. 7) WRITE (MSG,520) VNAME(6),IVAL(6)
      CALL ABEND (MSG)
C------------------------------------
  510 FORMAT(//10X,'ERROR: INVALID CONTROL PARAMETERS'/
     *         10X,'*********************************'///)
  520 FORMAT(10X,A5,' - ',I10/)
C
      END
C***********************************************************************
C
```

```
      SUBROUTINE SETUP
C     ... INITIALIZE DATA FOR EACH STATE
C
C**********************************************************************
C
      COMMON/DEBUG/LIST,TEST,DEBUG
      COMMON/LOG/UEOF,TAPOK
      COMMON/FLAGS/NFLAG,NFTOTL,KNTBAD(39),KNTOTL(39)
      COMMON/AQ/IDAQ,LEVLAQ,AQNAME
      COMMON/PREV/NPCL,NP4,NP11,NP12
      COMMON/DEVICE/MSG,IPARM,ISUP,IAQ,ICEN,IOUT,IHASH
      COMMON/INDEX/NT,LH,IAL,ISEQ,NTL,IDMAX,ISAVE,NSTATE,CRIT,
     * NUMREC,NUMTAP,MAX,NUMAQR(16)
      COMMON/PRVALS/ICLPR(100),KNTYPR(100),MCDPR(100),
     * LNGPR(100),LATPR(100),LANDPR(100),NTOTAL(10,100),CH1PR(100),
     * CH2PR(100),CH3PR(100),CH4PR(100),CH5PR(100),CH6PR(100),
     * PSADPR(100),CNPR(100),FLAGPR(100)
C
      LOGICAL UEOF,TAPOK
      LOGICAL LIST,TEST,DEBUG
      CHARACTER AQNAME*16
      CHARACTER CH1PR*4,CH2PR*9,CH3PR*11,CH4PR*19,CH5PR*5,CH6PR*4,
     * PSADPR*1,CNPR*16,FLAGPR*1
C
C----------------------------------------------------------------------
C
C     ... INITIALIZE TAPOK
      TAPOK - .TRUE.
C
C     ... INITIALIZE COUNTERS AND PARAMETERS
      ISEQ   - 0
      NUMTAP - 0
      NT     - 0
C
C     ... INITIALIZE TO MAKE SUBROUTINES WORK ON FIRST PASSES
      LH     - 0
      IAL    - 0
C
C     ... INITIALIZE PREVIOUS VALUES
      NPCL   - 0
      NP4    - 0
      NP11   - 0
      NP12   - 0
C
C     ... INITIALIZE NTOTAL MATRIX TO ZERO'S
      DO 20 I-1,100
      DO 10 NEL-1,10
         NTOTAL(NEL,I) - 0
   10 CONTINUE
   20 CONTINUE
C
C     ... INITIALIZE FLAG COUNTERS TO ZERO
      NFTOTL - 0
      NFLAG  - 0
      DO 30 I-1,39
         KNTBAD(I) - 0
         KNTOTL(I) - 0
   30 CONTINUE
C
      RETURN
      END
C**********************************************************************
C
      SUBROUTINE INPUT (AYR,LMAX,DATE,TIME,IALL,NSUP,LABEL,NTWP,NASUM,
     *                  MINCDE,MAXCDE)
C     ... READ CENSUS RECORDS AND CALL EXECUTION SUBPROGRAMS
```

```
C
C***********************************************************************
C
      COMMON/DEBUG/LIST,TEST,DEBUG
      COMMON/LOG/UEOF,TAPOK
      COMMON/DEVICE/MSG,IPARM,ISUP,IAQ,ICEN,IOUT,IHASH
      COMMON/INDEX/NT,LH,IAL,ISEQ,NTL,IDMAX,ISAVE,NSTATE,CRIT,
     *  NUMREC,NUMTAP,MAX,NUMAQR(16)
      COMMON/PARMS/IDSTAT,NTAPE,IUPD,ISUML,IREPL,IHIGHL,LOWL
      COMMON/CENSUS/ICL,KNTY,MCD,LNG,LAT,LAND,NDATA(10),CH1,CH2,CH3,
     *  CH4,CH5,CH6,PSAD,CN,FLAG
      COMMON/PREV/NPCL,NP4,NP11,NP12
      COMMON/FLAGS/NFLAG,NFTOTL,KNTBAD(39),KNTOTL(39)
      COMMON/AQ/IDAQ,LEVLAQ,AQNAME
      COMMON/PRVALS/ICLPR(100),KNTYPR(100),MCDPR(100),
     *  LNGPR(100),LATPR(100),LANDPR(100),NTOTAL(10,100),CH1PR(100),
     *  CH2PR(100),CH3PR(100),CH4PR(100),CH5PR(100),CH6PR(100),
     *  PSADPR(100),CNPR(100),FLAGPR(100)
C
      LOGICAL LIST,TEST,DEBUG
      LOGICAL MORE
      LOGICAL UEOF,TAPOK
      INTEGER NTWP(100)
      CHARACTER*128 X128
      CHARACTER CH1*4,CH2*9,CH3*11,CH4*19,CH5*5,CH6*4,PSAD*1,
     *  CN*16,FLAG*1
      CHARACTER CH1PR*4,CH2PR*9,CH3PR*11,CH4PR*19,CH5PR*5,CH6PR*4,
     *  PSADPR*1,CNPR*16,FLAGPR*1,LABEL*10
      CHARACTER AQNAME*16,AYR*2,AFID*5,DATE*8,TIME*8
      CHARACTER STATID*2,TRICK(9)*1
C
      EQUIVALENCE (TRICK(1),CH2), (TRICK(4),STATID)
      DATA ICL/99/,CH1/'AAAA'/,PSAD/'X'/,CH2/'BBBB'/
      DATA KNTY/9999/,MCD/999/,CH3/'CCCC'/,CH4/'DDDD'/
      DATA CH5/'EEEEE'/,CH6/'FFFF'/,LNG/9999/,LAT/9999/,LAND/9999/
      DATA CN/'CNCNCNCNCNCNCNCN'/,FLAG/'X'/
C
C-----------------------------------------------------------------------
C
   10 CONTINUE
C
C     ... SET FLAG AND BRANCH IF MAXIMUM NUMBER OF RECORDS TO BE
C         PROCESSED HAS BEEN REACHED.
      IF (NUMTAP .GE. MAX) THEN
        TAPOK = .FALSE.
        GOTO 999
      ENDIF
C
C     ... OPTIONALLY PRINT ADVISORY MESSAGE.
      NEXT = ISEQ + 1
      IF (LIST.AND.NUMTAP.LE.LMAX) THEN
309     WRITE (MSG,9309) NEXT,ICEN
9309    FORMAT (/10X,'PREPARING TO READ RECORD NUMBER ',I5,
     *     ' ON UNIT ',I2)
      ENDIF
C     ... READ CENSUS RECORD.
310   READ (ICEN,9310,ERR=666,END=999) AFID,ICL,CH1,PSAD,CH2,
     *        KNTY,MCD,CH3,CH4,CH5,
     *        CH6,LNG,LAT,LAND,CN,FLAG,(NDATA(I),I=1,5),
     *        (X128,I=1,67),IGASA,IGASB,(NDATA(I),I=7,10)
9310  FORMAT (A5,4X,I2,A4,13X,A1,1X,A9,2I3,A11,2X,A19,25X,A5,1X,A4,
     *        10X,I7,I6,I9,A16,51X,A1,40X,I9,9X,I9,18X,I9,9X,I9,
     *        90X,I9,67A128,58X,2I9,9X,4I9)
      NDATA(6)=IGASA+IGASB
C*****CONVERT LEVEL 15 TO LEVEL 16 (TO AVOID NESTING 16 WITHIN 15).
      IF (ICL.EQ.15) ICL=16
```

```
C
C     ... WRITE FIRST LMAX CENSUS RECORDS TO MESSAGE FILE IF REQUESTED
      IF (LIST .AND. NUMTAP .LE. LMAX) THEN
        WRITE (MSG,520) STATID,ICL,CH1,PSAD,CH2,KNTY,MCD,
     *    CH3,CH4,CH5,CH6,LNG,LAT,LAND,CN,FLAG,
     *    (NEL,NDATA(NEL),NEL=1,10)
      ENDIF
C
C     ... SECTION ANALYSIS (CHECK FOR TAIL SECTION)
      IF (KNTY .EQ. 0 .AND. ICL .NE. 4) THEN
        CALL TAIL (AYR,AFID,DATE,TIME,NTWP,NASUM,LABEL)
        GOTO 777
      ELSE
C       ... INCREMENT COUNT OF CENSUS RECORDS IN CURRENT FILE.
        NUMTAP = NUMTAP + 1
C       ... INCREMENT COUNT OF  CENSUS RECORDS FOR ALL STATES PROCESSED.
        NUMREC = NUMREC + 1
C       ... INCREMENT COUNT OF CENSUS RECORDS FOR CURRENT STATE
        ISEQ = ISEQ + 1
C     ...FIPS CODE RANGE TEST.
      IF ((KNTY.LT.MINCDE).OR.(KNTY.GT.MAXCDE)) GO TO 10
        IF (ISEQ .EQ. 1) THEN
          IF (ICL .NE. 4) THEN
            WRITE (MSG,530)
            CALL ABEND (MSG)
          ENDIF
        ENDIF
      ENDIF
C
C       ... CONVERT NUMERIC CHARACTER FOR STATE INTO INTEGER AND
C           VERIFY THAT STATE ID NUMBER FOR CONTROL PARAMETER IS
C           THE SAME AS THE FIRST RECORD ON EACH TAPE
      IF (NUMTAP .EQ. 1) THEN
         READ (STATID,'(J2)') ITEMP
            IF (IDSTAT .NE. ITEMP) THEN
            WRITE (MSG,560) IDSTAT,STATID
            CALL ABEND (MSG)
         ENDIF
      ENDIF
C
C
C     ... CHECK TO SEE IF LEVEL IS NOT AS EXPECTED (4 TO 16)
      IF (ICL .LT. 4 .OR. ICL .GT. 16) THEN
        WRITE (MSG,575) ICL,ISEQ
        CALL ABEND (MSG)
      ENDIF
C     ... ASSUME A FLAG ONLY IF FLAG = '1'
      IF (FLAG .EQ. '1') THEN
        IFLAG = 1
      ELSE
        IFLAG = 0
        IF (FLAG .NE. ' ') WRITE (MSG,570) FLAG,ISEQ
      ENDIF
C
C     ... INCREMENT SUPPRESSION COUNTS
      KNTBAD(ICL) = KNTBAD(ICL) + IFLAG
      KNTOTL(ICL) = KNTOTL(ICL) + 1
      NFLAG = NFLAG + IFLAG
      NFTOTL = NFTOTL + 1
C
      N4 = IDSTAT
      N11 = KNTY
      N12 = MCD
C
C     ... DEBUGGING OPTIONS
      IF (DEBUG.AND.NUMTAP.LE.LMAX .AND. IUPD .NE. 0) THEN
      WRITE (MSG,901) ISEQ,IUPD,(LL,NUMAQR(LL),LL-1,LOWL),
  901   FORMAT (/10X,'RECORD NUMBER ........................',I3//
     *    10X,'IUPD - ',I3/
     *    10X,'VALUES OF NUMAQR'/
     *    99(10X,I5,2X,I10/))
        IF (IDMAX.GT.0) WRITE (MSG,902) (LL,KNTYPR(LL),LL-1,IDMAX)
  902   FORMAT (/10X,'VALUES OF KNTYPR'/
     *    100(10X,I5,2X,I10/))
      ENDIF
C
      CALL ALLOC (NSUP)
C
C     ... SUM SELECTION
      IF (IUPD .EQ. 1 .OR. IUPD .EQ. 2) THEN
        CALL CATEG (LMAX,NPCL,LOWL)
        CALL SEEK (LMAX,NTWP,NASUM)
      ELSEIF (IUPD .EQ. 3) THEN
        CALL LEVEL
        IF (ISUML .EQ. ICL) CALL SEEK (LMAX,NTWP,NASUM)
      ENDIF
C
      CALL OUTPUT (AYR,AFID,DATE,TIME,IALL,LMAX,NCY,NALL,LABEL)
C
C     ... ASSIGN PREVIOUS VALUES
      NPCL - ICL
      NP4  - N4
      NP11 - N11
      NP12 - N12
C
      GOTO 10
C
  666 WRITE (MSG,540) NIX,ICL,CH1,CN,FLAG,(NDATA(I),I-1,5),
     *   (NDATA(I),I-7,10)
      WRITE (MSG,520) STATID,ICL,CH1,PSAD,CH2,KNTY,MCD,CH3,CH4,CH5,CH6,
     *   LNG,LAT,LAND,CN,FLAG,(I,NDATA(I),I-1,10)
      CALL ABEND (MSG)
C
C     ... FLUSH OUT REMAINING TAPES FOR STATE (TAIL SECTIONS)
  777 CALL ENDFIL (NT,NTAPE,MORE,ISEQ,NUMTAP,NCY,NALL)
      IF (MORE) THEN
        NEXT - NT + 1
        WRITE (MSG,550) NEXT
      ELSE
        RETURN
      ENDIF
      GOTO 777
C
C     ... GET REMAINING TAPES FOR STATE AND KEEP PROCESSING RECORDS
  999 CALL ENDFIL (NT,NTAPE,MORE,ISEQ,NUMTAP,NCY,NALL)
      IF (MORE) THEN
        GOTO 10
      ELSE
         WRITE (MSG,580)
        RETURN
      ENDIF
C     ...MAXIMUM NO. OF RECORDS READ; WRITE MESSAGE & TERMINATE.
  888 WRITE (MSG,590) NSTATE,NUMREC
      CALL TERM(MSG)
C-----------------------------------------------------------------------
  510 FORMAT(18X,I2,A4,A1,A9,I4,I3,A11,A19,A5,A4,I7,I6,I9,A16,A1,
     *  11I9)
  520 FORMAT(/10X,'CENSUS DATA    (STATE - ',A2,')'/
     *          10X,'————————————————————————————'/
     * 10X,'ICL ......',18('.'),I2/
     * 10X,'CH1 ......',16('.'),A4/
     * 10X,'PSAD .....',19('.'),A1/
     *  10X,'CH2 ......',11('.'),A9/
     *  10X,'KNTY .....',16('.'),I4/
     *  10X,'MCD ......',17('.'),I3/
     *  10X,'CH3 ......',9('.'),A11/
     *  10X,'CH4 ......',1('.'),A19/
     *  10X,'CH5 ......',15('.'),A5/
     *  10X,'CH6 ......',16('.'),A4/
     *  10X,'LNG .....'',13('.'),I7/
     *  10X,'LAT ......',14('.'),I6/
     *  10X,'LAND .....',11('.'),I9/
     *  10X,'CN .......',4('.'),A16/
     *  10X,'FLAG .....',19('.'),A1/
     *  10(10X,'NDATA(',I2,') ',11('.'),I9/))
  530 FORMAT(//10X,'ERROR: FIRST STATE RECORD ===> LEVEL IS NOT 4'//)
  540 FORMAT(//10X,'ERROR READING CENSUS TAPE AT 310'//
     *   10X,'STATUS CODE IS ',I12/
     *   10X,'ICL=',I10/10X,'CH1=',A4/10X,'CN=',A16/10X,'FLAG=',A1/
     *   10X,'NDATA(1-5)= ',5I12/
     *   10X,'NDATA(7-10)=',4I12///)
  550 FORMAT(/10X,'NOTE:  TAPE ',I2,' IS ALL TAIL SECTION'//)
  560 FORMAT(//10X,'ERROR: MISMATCH BETWEEN CONTROL/CENSUS STATE ID'/
     *  10X,'(CONTROL PARAMETER)    IDSTAT = ',I5/
     *  10X,'(CENSUS DATA)          STATID = ',A5//)
  570 FORMAT(/10X,'WARNING: INVALID FLAG (',A1,')  FOR REC # ',I10/)
  575 FORMAT(/10X,'ERROR: SUMMARY LEVEL =',I5,'REC #',I10)
  580 FORMAT(//10X,'WARNING:  NO TAIL SECTION FOR STATE'/)
  590 FORMAT (//10X,'PROGRAM ENDED.'/
     *  12X,'STATES PROCESSED  = ',I10/
     *  12X,'RECORDS PROCESSED = ',I10)
C
      END
C***********************************************************************
C
      SUBROUTINE ALLOC (NSUP)
C
C     DETERMINE WHETHER CURRENT ALLOCATION RECORD SHOULD BE SELECTED
C     FOR OUTPUT.  IF SO, SET IAL=ICL.
C
C***********************************************************************
C
      COMMON/DEBUG/LIST,TEST,DEBUG
      COMMON/DEVICE/MSG,IPARM,ISUP,IAQ,ICEN,IOUT,IHASH
      COMMON/INDEX/NT,LH,IAL,ISEQ,NTL,IDMAX,ISAVE,NSTATE,CRIT,
     *  NUMREC,NUMTAP,MAX,NUMAQR(16)
      COMMON/PARMS/IDSTAT,NTAPE,IUPD,ISUML,IREPL,IHIGHL,LOWL
      COMMON/PREV/NPCL,NP4,NP11,NP12
      COMMON/FLAGS/NFLAG,NFTOTL,KNTBAD(39),KNTOTL(39)
      COMMON/CENSUS/ICL,KNTY,MCD,LNG,LAT,LAND,NDATA(10),CH1,CH2,CH3,
     *  CH4,CH5,CH6,PSAD,CN,FLAG
C
      LOGICAL LIST,TEST,DEBUG
      CHARACTER*3 WARN
      CHARACTER CH1*4,CH2*9,CH3*11,CH4*19,CH5*5,CH6*4,PSAD*1,
     *  CN*16,FLAG*1
C-----------------------------------------------------------------------
C
      IF (ICL .LT. IHIGHL) THEN
        LH = 0
        IAL = 0
        IF (ICL .NE. 12) RETURN
C       ... OCCUPIED HOUSING COUNT TEST AND FRACTION
        IF (NFTOTL .EQ. 0) PCBAD = 0.0
        IF (NFTOTL .GT. 0) THEN
          PCBAD = REAL(NFLAG)/REAL(NFTOTL)
          IF (PCBAD .GT. CRIT) THEN
            WARN = '***'
          ELSE
            WARN = '   '
          ENDIF
        ENDIF
C       ... SUPPRESSION DETAIL FILE AND REPORT
        NSUP=NSUP+1
        WRITE (ISUP) NP4,NP11,NP12,NFLAG,NFTOTL,PCBAD,WARN
        IF (TEST.OR.
     *     (.NOT.TEST.AND.WARN.NE.'   ')) THEN
             WRITE (MSG,520) ISEQ,NP4,NP11,NP12,NFLAG,NFTOTL,PCBAD,WARN
        ENDIF
      ELSEIF (ICL .EQ. IHIGHL) THEN
        LH  = ICL
        IAL = ICL
      ELSE
        IF (ICL .GT. LOWL) RETURN
        IF (ICL .EQ. NPCL .AND. LH .EQ. ICL) THEN
          IAL = ICL
        ELSE
          IF (LH .LE. 0) THEN
            LH = ICL
            IAL = ICL
          ENDIF
        ENDIF
      ENDIF
C
      IF ((IAL.EQ.ICL).AND.DEBUG.AND.(NUMTAP.LE.LMAX)) THEN
         WRITE (6,9150) IAL,NUMAQR(IAL),CN
9150     FORMAT (10X,'ALLOCATION SELECTED: ',I2,1X,J4,1X,A16)
      END IF
      RETURN
C-----------------------------------------------------------------------
520   FORMAT (10X,'SUPPRESSION REPORT OF RECORD',I7,':',I2,3I5,I7,
     *   F6.4,A3)
C
      END
C**********************************************************************
C
      SUBROUTINE CATEG (LMAX,NPCL,LOWL)
C     ... DETERMINE CATEGORIES AND CALL UPDATE AS REQUIRED
C
C**********************************************************************
C
      COMMON/DEBUG/LIST,TEST,DEBUG
      COMMON/DEVICE/MSG,IPARM,ISUP,IAQ,ICEN,IOUT,IHASH
      COMMON/INDEX/NT,LH,IAL,ISEQ,NTL,IDMAX,ISAVE,NSTATE,CRIT,
     *  NUMREC,NUMTAP,MAX,NUMAQR(16)
      COMMON/AQ/IDAQ,LEVLAQ,AQNAME
      COMMON/CENSUS/ICL,KNTY,MCD,LNG,LAT,LAND,NDATA(10),CH1,CH2,CH3,
     *  CH4,CH5,CH6,PSAD,CN,FLAG
C
      LOGICAL LIST,TEST,DEBUG
      CHARACTER AQNAME*16
      CHARACTER CH1*4,CH2*9,CH3*11,CH4*19,CH5*5,CH6*4,PSAD*1,
     *  CN*16,FLAG*1
C----------------------------------------------------------------------
C
C     ... DEBUGGING OPTIONS
100   IF (DEBUG.AND.NUMTAP.LE.LMAX) WRITE (MSG,9100) LEVLAQ,ICL,NPCL,
     *  AQNAME,CN,IDAQ
9100  FORMAT (/10X,'VALUES ON ENTRY TO SUBROUTINE CATEG'/
     *  10X,'LEVLAQ ...',I3/
     *  10X,'ICL.......',I3/
     *  10X,'NPCL......',I3/
     *  10X,'AQNAME...',A16/
     *  10X,'CN.......',A16/
     *10X,'IDAQ.....',J4/)
C
C*****COMPARE PREVIOUS AND CURRENT CENSUS SUMMARY LEVELS.
      IF (NPCL.GE.ICL) THEN
         CALL RENUM (NUMAQR(ICL-1),ICL,LOWL)
      END IF
C*****COMPARE UPDATE AND CENSUS SUMMARY LEVELS AND NAMES
      IF (LEVLAQ.EQ.ICL) THEN
         IF (AQNAME.EQ.CN) THEN
            CALL RENUM (IDAQ,ICL,LOWL)
            CALL UPDATE
            RETURN
         ELSE IF (AQNAME.LT.CN) THEN
            WRITE (4,9150) ICL,AQNAME
9150        FORMAT (10X,'ERROR: UPDATE LEVEL/NAME ',I2,1X,A16/
     *              10X,'WAS NOT FOUND IN CENSUS FILE.'/
     *      10X,'TASK ABORTED.'///)
            CALL EXIT
         ELSE
            RETURN
         END IF
      ELSE IF (LEVLAQ.LT.ICL) THEN
         RETURN
      ELSE
         WRITE (6,9150)
         CALL EXIT
      END IF
      RETURN
      END
C***********************************************************************
C
      SUBROUTINE UPDATE
C     ... READ UPDATE FILE AND COMPUTE TOTALS FOR AQCR REGIONS
C
C***********************************************************************
C
      COMMON/DEBUG/LIST,TEST,DEBUG
      COMMON/DEVICE/MSG,IPARM,ISUP,IAQ,ICEN,IOUT,IHASH
      COMMON/LOG/UEOF,TAPOK
      COMMON/PARMS/IDSTAT,NTAPE,IUPD,ISUML,IREPL,IHIGHL,LOWL
      COMMON/AQ/IDAQ,LEVLAQ,AQNAME
C
      LOGICAL LIST,TEST,DEBUG
      LOGICAL UEOF,TAPOK
      CHARACTER AQNAME*16,IMAGE*80
C-----------------------------------------------------------------------
C
      IF (UEOF) RETURN
C
C     ...READ UPDATE RECORD.
C       IDAQ   I4      1-4    FIPS IDENTIFIER OF CENSUS ENTITY (STATE,
C                             COUNTY, TOWNSHIP, ETC.) TO BE CREATED
C                             AND TO WHICH VALUES OF HOUSING AND
C                             POPULATION COUNTS SHOULD BE ASSIGNED.
C       LEVLAQ I2      6-7    LEVEL (04 TO 16) OF EXISTING ENTITY
C                             TO BE ASSIGNED TO THE ENTITY WITH THE
C                             FIPS IDENTIFIER.
C       AQNAME A16     9-24   NAME OF EXISTING ENTITY.
C
C      NOTE: RECORDS ARE HIERARCHICAL.  ENTITIES DO NOT HAVE TO
C      BE REPRESENTED UNLESS THEY ARE ASSIGNED TO CENSUS ENTITIES
C      DIFFERENT FROM THOSE INDICATED BY SUPERSET ENTITIES.  THUS
C      IF EVERY TOWNSHIP IN A STATE IS ASSIGNED TO ONE AQCR, ONLY
C      ONE RECORD (FOR THE STATE) IS REQUIRED.  IF ONE TOWNSHIP IN
C      THAT STATE IS ASSIGNED TO ANOTHER AQCR, THE TOWNSHIP AND
C      THE COUNTY OF THAT TOWNSHIP MUST BE GIVEN.  THE
```

```
C      COUNTY WOULD SHOW THE ASSIGNMENT OF THE STATE BUT THE
C      TOWNSHIP WOULD SHOW THE EXCEPTIONAL AQCR.  A FICTITIOUS
C      EXAMPLE, SHOWING ARBITRARY AQCR'S 0216 AND 0130:
C
C                   0216 04 MASSACHUSETTS
C                   0216 11 PEMBROKE
C                   0130 12 WILLIAMS CREEK
C
      READ (IAQ,510,ERR-666,END-999) IDAQ,LEVLAQ,AQNAME,IMAGE
      WRITE (MSG,9100) IMAGE
9100  FORMAT (/7X,'***UPDATE RECORD IMAGE: ',A80)
C
C------------------------------------------------------------------
C
      RETURN
C
  999 UEOF - .TRUE.
      RETURN
C
  666 WRITE (MSG,520)
      CALL ABEND (MSG)
C------------------------------------------------------------------
  510 FORMAT (I4,1X,I2,1X,A16,T1,A80)
  520 FORMAT (//10X,'ERROR READING FROM UPDATE FILE')
C
      END
C*****************************************************************
C
      SUBROUTINE RENUM(NEWVAL,ISTART,ISTOP)
C      ... ASSIGN NEW VALUES TO NUMAQR
C
C*****************************************************************
C
      COMMON/DEBUG/LIST,TEST,DEBUG
      COMMON/DEVICE/MSG,IPARM,ISUP,IAQ,ICEN,IOUT,IHASH
      COMMON/INDEX/NT,LH,IAL,ISEQ,NTL,IDMAX,ISAVE,NSTATE,CRIT,
     *  NUMREC,NUMTAP,MAX,NUMAQR(16)
C
      LOGICAL LIST,TEST,DEBUG
C-----------------------------------------------------------------
C
      DO 10 I-ISTART,ISTOP
        NUMAQR(I) - NEWVAL
   10 CONTINUE
C
      RETURN
      END
C*****************************************************************
C
      SUBROUTINE SEEK (LMAX,NTWP,NASUM)
C      ... SEEK SUM. LINE FOR GIVEN AQCR AND CALL SUM
C
C*****************************************************************
C
      COMMON/DEBUG/LIST,TEST,DEBUG
      COMMON/DEVICE/MSG,IPARM,ISUP,IAQ,ICEN,IOUT,IHASH
      COMMON/INDEX/NT,LH,IAL,ISEQ,NTL,IDMAX,ISAVE,NSTATE,CRIT,
     *  NUMREC,NUMTAP,MAX,NUMAQR(16)
      COMMON/PARMS/IDSTAT,NTAPE,IUPD,ISUML,IREPL,IHIGHL,LOWL
      COMMON/CENSUS/ICL,KNTY,MCD,LNG,LAT,LAND,NDATA(10),CH1,CH2,CH3,
     *  CH4,CH5,CH6,PSAD,CN,FLAG
      COMMON/PRVALS/ICLPR(100),KNTYPR(100),MCDPR(100),
     *  LNGPR(100),LATPR(100),LANDPR(100),NTOTAL(10,100),CH1PR(100),
     *  CH2PR(100),CH3PR(100),CH4PR(100),CH5PR(100),CH6PR(100),
     *  PSADPR(100),CNPR(100),FLAGPR(100)
C
```

```
      LOGICAL LIST,TEST,DEBUG
      INTEGER NTWP(100)
      CHARACTER CH1PR*4,CH2PR*9,CH3PR*11,CH4PR*19,CH5PR*5,CH6PR*4,
     *  PSADPR*1,CNPR*16,FLAGPR*1
      CHARACTER CH1*4,CH2*9,CH3*11,CH4*19,CH5*5,CH6*4,PSAD*1,
     *  CN*16,FLAG*1
C----------------------------------------------------------------------
C
      IF (IDMAX .GT. 0) THEN
C       ... SEEK AQCR.
        DO 10 IDNUM-1,IDMAX
          IF (KNTYPR(IDNUM) .EQ. NUMAQR(ICL)) THEN
            CALL SUM (IDNUM,LMAX,NTWP,NASUM)
            RETURN
          ENDIF
   10   CONTINUE
C       ... AQCR NOT FOUND.  BRANCH IF 100 HAVE NOT YET BEEN ENCOUNTERED.
        IF (IDMAX .GE. 100) THEN
          WRITE (MSG,520)
          CALL ABEND (MSG)
        ENDIF
      ENDIF
C
C     ... INCREMENT COUNT AND ADD NEW AQCR TO LIST.
      WRITE (MSG,510) NUMAQR(ICL),ISEQ
      IDMAX - IDMAX + 1
      CALL ADDREC (LMAX,NTWP,NASUM)
C
      RETURN
C-------------------------------------
  510 FORMAT(/10X,'AQCR (',J4,') FIRST FOUND IN RECORD',I10/)
  520 FORMAT(//10X,'ERROR:  MORE THAN 100 AQCRS ARE ENCOUNTERED.'//)
C
      END
C**********************************************************************
C
      SUBROUTINE ADDREC (LMAX,NTWP,NASUM)
C
C     ... ADD AN AQCR RECORD
C
C**********************************************************************
C
      COMMON/DEBUG/LIST,TEST,DEBUG
      COMMON/DEVICE/MSG,IPARM,ISUP,IAQ,ICEN,IOUT,IHASH
      COMMON/CENSUS/ICL,KNTY,MCD,LNG,LAT,LAND,NDATA(10),CH1,CH2,CH3,
     *  CH4,CH5,CH6,PSAD,CN,FLAG
      COMMON/PRVALS/ICLPR(100),KNTYPR(100),MCDPR(100),
     *  LNGPR(100),LATPR(100),LANDPR(100),NTOTAL(10,100),CH1PR(100),
     *  CH2PR(100),CH3PR(100),CH4PR(100),CH5PR(100),CH6PR(100),
     *  PSADPR(100),CNPR(100),FLAGPR(100)
      COMMON/INDEX/NT,LH,IAL,ISEQ,NTL,IDMAX,ISAVE,NSTATE,CRIT,
     *  NUMREC NUMTAP,MAX,NUMAQR(16)
C
      LOGICAL LIST,TEST,DEBUG
      INTEGER NTWP(100)
      CHARACTER CH1PR*4,CH2PR*9,CH3PR*11,CH4PR*19,CH5PR*5,CH6PR*4,
     *  PSADPR*1,CNPR*16,FLAGPR*1
      CHARACTER CH1*4,CH2*9,CH3*11,CH4*19,CH5*5,CH6*4,PSAD*1,
     *  CN*16,FLAG*1
C----------------------------------------------------------------------
C
      KNTYPR(IDMAX) - NUMAQR(ICL)
      ICLPR(IDMAX)  - ICL
      CH1PR(IDMAX)  - CH1
      PSADPR(IDMAX) - PSAD
      CH2PR(IDMAX)  - CH2
      MCDPR(IDMAX)  - MCD
      CH3PR(IDMAX)  - CH3
      CH4PR(IDMAX)  - CH4
      CH5PR(IDMAX)  - CH5
      CH6PR(IDMAX)  - CH6
      LNGPR(IDMAX)  - LNG
      LATPR(IDMAX)  - LAT
      LANDPR(IDMAX) - 0
      CNPR(IDMAX)   - CN
      FLAGPR(IDMAX) - FLAG
C
C     ... STORE VALUE OF NDATA IN NTOTAL
      CALL SUM (IDMAX,LMAX,NTWP,NASUM)
C
      RETURN
      END
C**********************************************************************
C
      SUBROUTINE SUM (JNDEX,LMAX,NTWP,NASUM)
C     ... ADD CENSUS RECORD VALUES FOR 10 DISTRIBUTION VARIABLES
C         TO CORRESPONDING AQCR TOTALS.
C
C**********************************************************************
C
      COMMON/DEBUG/LIST,TEST,DEBUG
      COMMON/DEVICE/MSG,IPARM,ISUP,IAQ,ICEN,IOUT,IHASH
      COMMON/INDEX/NT,LH,IAL,ISEQ,NTL,IDMAX,ISAVE,NSTATE,CRIT,
     *  NUMREC,NUMTAP,MAX,NUMAQR(16)
      COMMON/CENSUS/ICL,KNTY,MCD,LNG,LAT,LAND,NDATA(10),CH1,CH2,CH3,
     *  CH4,CH5,CH6,PSAD,CN,FLAG
      COMMON/PRVALS/ICLPR(100),KNTYPR(100),MCDPR(100),
     *  LNGPR(100),LATPR(100),LANDPR(100),NTOTAL(10,100),CH1PR(100),
     *  CH2PR(100),CH3PR(100),CH4PR(100),CH5PR(100),CH6PR(100),
     *  PSADPR(100),CNPR(100),FLAGPR(100)
C
      LOGICAL LIST,TEST,DEBUG
      INTEGER NTWP(100)
      CHARACTER CH1*4,CH2*9,CH3*11,CH4*19,CH5*5,CH6*4,PSAD*1,
     *  CN*16,FLAG*1
      CHARACTER CH1PR*4,CH2PR*9,CH3PR*11,CH4PR*19,CH5PR*5,CH6PR*4,
     *  PSADPR*1,CNPR*16,FLAGPR*1
C----------------------------------------------------------------------
C
C     ... DEBUGGING OPTIONS
      IF (DEBUG.AND.NUMTAP.LE.LMAX) WRITE (MSG,901) CN,ICL,IAL,JNDEX
  901 FORMAT(/10X,'VALUES ON ENTERING SUBROUTINE SUM:'/
     *  10X,'CN........',A16/
     *  10X,'ICL.......',I3/
     *  10X,'IAL.......',I3/
     *   10X,'JNDEX.....',I3/)
C
      IF (IAL .NE. ICL) THEN
         IF (ICL.EQ.12) THEN
            NTWP(JNDEX)-NTWP(JNDEX)+1
            LANDPR(JNDEX)-LANDPR(JNDEX)+LAND
            WRITE (4,9105) NTWP(JNDEX),JNDEX,ICL,LAND,CN
9105        FORMAT (10X,'ADDED: ',I5,1X,I1,1X,J2,2X,I9,2X,A16)
         ENDIF
         RETURN
      ENDIF
C
      IF (DEBUG.AND.NUMTAP.LE.LMAX) WRITE (MSG,902) KNTYPR(JNDEX)
  902 FORMAT(10X,'DATA ARE BEING SUMMED TO AQCR # ',J4)
C
C     ... INCREMENT SUMMATION ACCUMULATOR.
      NASUM-NASUM+1
```

```
C     ... ADD VALUES IN RECORD TO CORRESPONDING AQCR ACCUMULATORS.
      DO 10 NEL=1,10
         NTOTAL(NEL,JNDEX) = NTOTAL(NEL,JNDEX) + NDATA(NEL)
   10 CONTINUE
C
      RETURN
      END
C**********************************************************************
C
      SUBROUTINE LEVEL
C     ... IDENTIFY SUMMARY LEVEL
C
C**********************************************************************
C
      COMMON/DEBUG/LIST,TEST,DEBUG
      COMMON/DEVICE/MSG,IPARM,ISUP,IAQ,ICEN,IOUT,IHASH
      COMMON/PARMS/IDSTAT,NTAPE,IUPD,ISUML,IREPL,IHIGHL,LOWL
      COMMON/INDEX/NT,LH,IAL,ISEQ,NTL,IDMAX,ISAVE,NSTATE,CRIT,
     *  NUMREC,NUMTAP,MAX,NUMAQR(16)
      COMMON/CENSUS/ICL,KNTY,MCD,LNG,LAT,LAND,NDATA(10),CH1,CH2,CH3,
     *  CH4,CH5,CH6,PSAD,CN,FLAG
C
      LOGICAL LIST,TEST,DEBUG
      CHARACTER CH1*4,CH2*9,CH3*11,CH4*19,CH5*5,CH6*4,PSAD*1,
     *  CN*16,FLAG*1
C----------------------------------------------------------------------
C
      IF (ISUML .NE. ICL) RETURN
      IF (ISUML .EQ. 11) NUMAQR(ICL) = KNTY
      IF (ISUML .EQ. 12) NUMAQR(ICL) = MCD
C
      RETURN
      END
C**********************************************************************
C
      SUBROUTINE OUTPUT (AYR,AFID,DATE,TIME,IALL,LMAX,NCY,NALL,LABEL)
C     ... WRITE CONDENSED CENSUS RECORDS TO OUTPUT FILES
C
C**********************************************************************
C
      COMMON/DEBUG/LIST,TEST,DEBUG
      COMMON/DEVICE/MSG,IPARM,ISUP,IAQ,ICEN,IOUT,IHASH
      COMMON/PARMS/IDSTAT,NTAPE,IUPD,ISUML,IREPL,IHIGHL,LOWL
      COMMON/INDEX/NT,LH,IAL,ISEQ,NTL,IDMAX,ISAVE,NSTATE,CRIT,
     *  NUMREC,NUMTAP,MAX,NUMAQR(16)
      COMMON/CENSUS/ICL,KNTY,MCD,LNG,LAT,LAND,NDATA(10),CH1,CH2,CH3,
     *  CH4,CH5,CH6,PSAD,CN,FLAG
      COMMON/AQ/IDAQ,LEVLAQ,AQNAME
      COMMON /HASH1/ CDATE7,CTIME7,NCNTY7,LKEY7,NSIZE7,NPRMT7,IT7
C
C
      INTEGER IT7(3,4001)
      REAL CDATE7(2),CTIME7(2)
      LOGICAL LIST,TEST,DEBUG
      CHARACTER CH1*4,CH2*9,CH3*11,CH4*19,CH5*5,CH6*4,PSAD*1,
     *  CN*16,FLAG*1,LABEL*10
      CHARACTER AQNAME*16,AYR*2,AFID*5,DATE*8,TIME*8
C----------------------------------------------------------------------
C
C     ... DEBUGGING OPTIONS
      IF (DEBUG.AND.NUMTAP.LE.LMAX) THEN
        WRITE (MSG,901) IAL,ICL,CN,AQNAME,LH,IUPD,NTL
  901   FORMAT(/10X,'VALUES ON ENTRY TO SUBROUTINE OUTPUT'/
     *    10X,'IAL ...........',I3/
     *    10X,'ICL............',I3/
     *    10X,'CN.............',A16/
     *    10X,'AQNAME.........',A16/
     *    10X,'LH.............',I3/
     *    10X,'IUPD...........',I3/
     *    10X,'NTL............',I3/)
      ENDIF
C
C
      IF (ICL.LT.NTL) RETURN
      IF (ICL.EQ.NTL) THEN
         IF (IUPD.NE.0) RETURN
         AQNAME-CN
         NCY-NCY+1
         CALL BFMT
         RETURN
      ENDIF
      IF (IAL.EQ.ICL) THEN
         NALL-NALL+1
         CALL BFMT
         RETURN
      ENDIF
      IF ((IUPD.GT.1).AND.(ICL.EQ.12)) THEN
         NALL-NALL+1
         CALL BFMT
         RETURN
      ENDIF
      RETURN
C
      SUBROUTINE BFMT
C
C*****SAVE EMISSION TOTAL OR ALLOCATION RECORD IN B FORMAT.
C
      IALL-IALL+1
      IF (IUPD.NE.0) THEN
         IKK-NUMAQR(ICL)
      ELSE
         IKK-KNTY
      END IF
      CALL NEDS (IDSTAT,IKK,NEDST,NEDKY)
      IF (.NOT.DEBUG.OR.NUMTAP.GT.LMAX) GO TO 400
      WRITE (MSG,9310) IDSTAT,NEDST,KNTY,NEDKY
9310  FORMAT (10X,'CODE CONVERSION:'/
     *        12X,'STATE:  FROM ',2X,J2,' TO   ',J2/
     *        12X,'COUNTY: FROM ',J4,' TO ',J4/)
      WRITE (MSG,9320,ERR-600) NEDST,NEDKY,MCD,NUMAQR(ICL),ISEQ,
     *  CDATE7,CTIME7,DATE,TIME,AYR,AFID,LABEL,
     *  ICL,CH1,PSAD,CH2,KNTY,MCD,CH3,CH4,CH5,CH6,LNG,LAT,LAND,
     *  AQNAME,CN,FLAG,(NDATA(NEL),NEL-1,10)
9320  FORMAT (10X,'RECORD TO OUTPUT FILE:'/
     *        12X,J2,J4,J3,J4,J9/
     *        12X,4A4,1X,2A8,1X,A2,1X,A5,1X,A10/
     *        12X,J2,A4,A1,A9,2J3,A11,A19,A5,A4/
     *        12X,J7,J6,1X,J9,A16,1X,A16,A1/
     *        12X,5I9/
     *        12X,5I9)
400   WRITE (IOUT,ERR-610) NEDST,NEDKY,MCD,NUMAQR(ICL),ISEQ,
     *             CDATE7,CTIME7,DATE,TIME,AYR,AFID,LABEL,
     *             ICL,CH1,PSAD,CH2,KNTY,MCD,CH3,CH4,CH5,CH6,
     *             LNG,LAT,LAND,AQNAME,CN,FLAG,(NDATA(NEL),NEL-1,10)
      RETURN
C
600   WRITE (MSG,9600) IALL
9600  FORMAT (/10X,'ERROR IN ATTEMPT TO PRINT ALLOCATION RECORD ',
     *  I7)
      CALL ABEND (MSG)
610   WRITE (MSG,9610) IALL
9610  FORMAT (/10X,'ERROR IN ATTEMPT TO WRITE ALLOCATION RECORD ',
     *              I7,' TO TAPE.')
      CALL ABEND (MSG)
      END
C*********************************************************************
C
      SUBROUTINE TAIL (AYR,AFID,DATE,TIME,NTWP,NASUM,LABEL)
C     ... WHEN CENSUS FILE REACHES TAIL WRITE SUPPRESSION FLAGS,
C         COUNTY/AQCR TOTALS, AND FLUSH OUT TAIL SECTION
C
C     *****NOTE: LNGAQ, LATAQ, CNAQ, AND KNTYAQ VALUES PROVIDED
C     IN THIS SUBROUTINE ARE SPECIFIC FOR 1980 CENSUS MASSACHUSETTS
C     DATA.  THIS IS NOT THEREFORE A GENERAL SOLUTION TO PROVIDING
C     AQCR LONGITUDES, LATITUDES, NAMES, AND AQCR FIPS CODENS.
C     THE PROGRAM MAY BE GENERALIZED BY INSERTING A READ (TO BE
C     ACTIVATED ON THE FIRST ENTRY TO THE SUBROUTINE ONLY) OF
C     A SPECIAL FILE CONTAINING THESE VALUES.  UNLESS FURTHER
C     PROGRAMMING IS DONE, THE VALUES WOULD HAVE TO BE GIVEN
C     IN ORDER OF APPEARANCE OF THE AQCR'S IN THE UPDATE
C     (AND ALSO CENSUS) FILE.
C
C*********************************************************************
C
      COMMON/DEBUG/LIST,TEST,DEBUG
      COMMON/DEVICE/MSG,IPARM,ISUP,IAQ,ICEN,IOUT,IHASH
      COMMON/LOG/UEOF,TAPOK
      COMMON/INDEX/NT,LH,IAL,ISEQ,NTL,IDMAX,ISAVE,NSTATE,CRIT,
     *  NUMREC,NUMTAP,MAX,NUMAQR(16)
      COMMON/PARMS/IDSTAT,NTAPE,IUPD,ISUML,IREPL,IHIGHL,LOWL
      COMMON/FLAGS/NFLAG,NFTOTL,KNTBAD(39),KNTOTL(39)
      COMMON/PRVALS/ICLPR(100),KNTYPR(100),MCDPR(100),
     *  LNGPR(100),LATPR(100),LANDPR(100),NTOTAL(10,100),CH1PR(100),
     *  CH2PR(100),CH3PR(100),CH4PR(100),CH5PR(100),CH6PR(100),
     *  PSADPR(100),CNPR(100),FLAGPR(100)
      COMMON /HASH1/ CDATE7,CTIME7,NCNTY7,LKEY7,NSIZE7,NPRMT7,IT7
C
      DIMENSION SUPLVL(39)
      CHARACTER*10   LABEL
      REAL CDATE7(2),CTIME7(2)
      INTEGER   LNGAQ(100) /0711000,0708000,0732000,0712500,
     *                      0726500,0719000,94*0/
      INTEGER   LATAQ(100) /423000,418000,424000,427000,424000,
     *                      424000,94*0/
      CHARACTER*16   CNAQ(100)  /'BOSTON AQCR     ','CAPE COD AQCR   ',
     *                 'BERKSHIRE AQCR  ','MERRIMACK AQCR  ',
     *                 'SPRINGFIELD AQCR','WORCESTER AQCR  ',94*' '/
      INTEGER   KNTYAQ(100) /1291,2121,0187,1274,1798,0369,94*0/
      LOGICAL LIST,TEST,DEBUG
      LOGICAL UEOF,TAPOK
      INTEGER NTWP(100),IZERO
      CHARACTER CH1PR*4,CH2PR*9,CH3PR*11,CH4PR*19,CH5PR*5,CH6PR*4,
     *  PSADPR*1,CNPR*16,FLAGPR*1,AYR*2,AFID*5,DATE*8,TIME*8
      DATA IZERO/0/
C---------------------------------------------------------------------
C
C     ... COMPUTE SUPPRESSION FACTORS AND WRITE TO FLAG FILE FOR STATE
      FACTOR - REAL(NFLAG)/REAL(NFTOTL)
      DO 10 I-1,LOWL
        IF (KNTOTL(I) .LE. 0) THEN
          SUPLVL(I) - 0.0
        ELSE
          SUPLVL(I) - REAL(KNTBAD(I))/REAL(KNTOTL(I))
        ENDIF
   10 CONTINUE
      WRITE (MSG,510) IDSTAT,NFLAG,NFTOTL,FACTOR,
     *  (K,KNTBAD(K),KNTOTL(K),SUPLVL(K),K-4,LOWL)
C
```

```
C     ... WRITE EMISSION TOTALS FOR EACH COUNTY / AQCR
      IF (IUPD .NE. 0) THEN
          WRITE (MSG,9305) FN
9305     FORMAT (/10X,'COUNTY EMISSION TOTALS FOR STATE ',A2,':'/)
         WRITE (MSG,9307) IDMAX
9307     FORMAT (/10X,'NUMBER OF GENERATED EMISSION TOTAL UNITS:',I4)
         WRITE (MSG,9308) NASUM
9308     FORMAT (10X,'NUMBER OF SUMMATIONS:',I24/)
         IF ((IUPD.EQ.1).OR.(IUPD.EQ.2)) THEN
            WRITE (MSG,9309) (' ',KNTYAQ(N),NTWP(N),N-1,IDMAX)
9309        FORMAT (/10X,'TOWNSHIPS ALLOCATED TO EMISSION TOTAL UNITS:'/
     *        99(9X,A1,'EMISSION TOTAL UNIT: ',J4,5X,I5/))
         ENDIF
         DO 20 I-1,IDMAX
            CALL NEDS (IDSTAT,KNTYAQ(I),NEDST,NEDKY)
            WRITE (MSG,9310) IDSTAT,NEDST,KNTYAQ(I),NEDKY
9310        FORMAT (10X,'CODE CONVERSION:'/
     *          12X,'STATE:  FROM ',2X,J2,' TO   ',J2/
     *          12X,'COUNTY: FROM ',J4,' TO ',J4/)
            DO 315 J-1,IDMAX
               IF (NEDKY.EQ.KNTYAQ(J)) GO TO 320
315         CONTINUE
            WRITE (MSG,9316) NEDKY
9316        FORMAT (10X,'NEDS AQCR ',J4,' WAS NOT FOUND IN REFERENCE '/
     *               10X,'TABLE.  DEFAULT IS USED.')
            J-100
320         WRITE (MSG,9320,ERR-666) NEDST,NEDKY,0,0,0,
     *        CDATE7,CTIME7,DATE,TIME,AYR,AFID,LABEL,
     *       11,CH1PR(I),PSADPR(I),CH2PR(I),
     *       KNTYAQ(I),0,CH3PR(I),CH4PR(I),CH5PR(I),CH6PR(I),
     *       LNGAQ(J),LATAQ(J),LANDPR(I),CNAQ(J),'                ',
     *       ' ',(NTOTAL(NEL,I),NEL-1,10)
500         WRITE (IOUT,ERR-666) NEDST,NEDKY,IZERO,IZERO,IZERO,
     *         CDATE7,CTIME7,DATE,TIME,AYR,AFID,LABEL,
     *       11,CH1PR(I),PSADPR(I),CH2PR(I),
     *       KNTYAQ(I),0,CH3PR(I),CH4PR(I),CH5PR(I),CH6PR(I),
     *       LNGAQ(J),LATAQ(J),LANDPR(I),CNAQ(J),'                ',
     *       ' ',(NTOTAL(NEL,I),NEL-1,10)
20        CONTINUE
      ENDIF
C
C     ANY REMAINING TAPES FOR THE STATE ARE ALL TAIL SECTIONS
      TAPOK - .FALSE.
C
      RETURN
C
  666 WRITE (MSG,530)
      CALL ABEND (MSG)
C-----------------------------------------------------------------------
510   FORMAT (/10X,40('.')/
     *    10X,'STATE SUMMARY:'/
     *  10X,'STATE  -',I10/
     *  10X,'NFLAG  -',I10/
     *  10X,'NFTOTL -',I10/
     *  10X,'FACTOR -',F10.4//
     *  10X,'LEVEL FLAGS     TOTAL  FRACTION'/
     *  39(10X,I2,I10,I10,F10.4/))
  520 FORMAT (18X,I2,A4,A1,A9,I4,I3,A11,A19,A5,A4,I7,I6,I9,A16,A1,
     *      10I9)
9320  FORMAT  (10X,'RECORD TO OUTPUT FILE: '/
     *          12X,J2,J4,J3,J4,J9/
     *          12X,4A4,1X,2A8,1X,A2,1X,A5,1X,A10/
     *          12X,J2,A4,A1,A9,J4,J3,A11,A19,A5,A4/
     *          12X,J7,J6,1X,J9,A16,1X,A16,A1/
     *          12X,5I9/12X,5I9/)
  530 FORMAT(///10X,'ERROR WRITING TO OUTPUT FROM TAIL')
```

```
C
      END
C
C*********************************************************************
C
      SUBROUTINE NEDS (IST,ICY,JST,JCY)
C
C     GIVEN FIPS STATE AND COUNTY CODES, RETURN NEDS EQUIVALENTS.
C     NOTE THAT 'INSERT' FLAG MUST BE SET TO .FALSE. FOR RETRIEVALS
C     TO BE POSSIBLE.
C
C*********************************************************************
C
      COMMON /DEVICE/MSG,IPARM,ISUP,IAQ,ICEN,IOUT,IHASH
      INTEGER ICNTY,JCNTY,IST,JST,NCNTY7,LKEY7,NSIZE7,NPRMT7,
     *        IT7(3,4001),IOSTAT,IRET,II,ICY,JCY
      REAL    CDATE7(2),CTIME7(2)
      LOGICAL INSERT,FIRST
      COMMON  /HASH1/ CDATE7,CTIME7,NCNTY7,LKEY7,NSIZE7,NPRMT7,IT7
      DATA    INSERT/.FALSE./, FIRST/.TRUE./
C
C---------------------------------------------------------------------
C
      IF (FIRST) THEN
        READ (IHASH,END=406,ERR=407) CDATE7,CTIME7,NCNTY7,LKEY7,NSIZE7,
     *   NPRMT7,IT7
        NX=0
        DO 888 K=1,4001
        ISUM = IT7(1,K) + IT7(2,K) + IT7(3,K)
        IF (ISUM.NE.0) NX=NX+1
888     CONTINUE
        WRITE (MSG,9334) NX
9334    FORMAT (10X,'NUMBER OF HASH TABLE ENTRIES: ',I10/)
        NX=0
        FIRST=.FALSE.
        GO TO 410
C*****  FIPS-NEDS INDEX TABLE FILE IS EMPTY.
406     WRITE (MSG,9406)
9406    FORMAT (/10X,'HASH TABLE IS NOT IN FILE.'/)
        CALL ABEND (MSG)
C*****  ERROR IN ATTEMPT TO READ FIPS-NEDS INDEX TABLE.
407     WRITE (MSG,9407) IOSTAT
9407    FORMAT (/10X,'ERROR ',I12, ' IN READING HASH TABLE FILE.')
        CALL ABEND (MSG)
      ENDIF
C*****OBTAIN CONSOLIDATED FIPS STATE-COUNTY NUMBER.
410   ICNTY=IST*10000+ICY
C*****OBTAIN CORRESPONDING CONSOLIDATED NEDS STATE-COUNTY NUMBER.
C     (NUMBER IS AT IT7(3,II).)
      CALL CHAIN2 (ICNTY,LKEY7,INSERT,NSIZE7,NPRMT7,IT7,IRET,II)
      IF (IRET.NE.0) THEN
        WRITE (MSG,9430) ICNTY
9430    FORMAT (/10X,'FIPS/NEDS HASHING TABLE ERROR WITH STATE/',
     *    'COUNTY',I7)
        CALL ABEND (MSG)
      ENDIF
C*****DISSECT CONSOLIDATED NEDS STATE-COUNTY NUMBER INTO ITS PARTS.
      JCNTY=IT7(3,II)
      JST=INT(JCNTY/10000)
      JCY=JCNTY-(JST*10000)
C
      RETURN
C
      END
C********************************************************************
C
```

```
      SUBROUTINE GETFIL (TYPE)
C     ... OPEN FILES AS REQUIRED
C
C***********************************************************************
C
      COMMON/PARMS/IDSTAT,NTAPE,IUPD,ISUML,IREPL,IHIGHL,LOWL
      COMMON/DEBUG/LIST,TEST,DEBUG
      COMMON/DEVICE/MSG,IPARM,ISUP,IAQ,ICEN,IOUT,IHASH
      COMMON/LOG/UEOF,TAPOK
C
      LOGICAL LIST,TEST,DEBUG
      LOGICAL UEOF,TAPOK
      CHARACTER TYPE*6
C-----------------------------------------------------------------------
C
      IF (TYPE .EQ. 'FLAGFL') THEN
C        ...OPEN SUPPRESSION FLAG FILE FOR STATE (OUTPUT)
         OPEN(ISUP,STATUS='OLD',ACCESS='SEQ',FORM='UNFORMATTED',
     *         FILE='DCFLAG.')
      ELSEIF (TYPE .EQ. 'AQCRFL') THEN
C        ...OPEN AQCR FILE FOR STATE (INPUT)
         OPEN(IAQ,STATUS='OLD',ACCESS='SEQ',FORM='FORMATTED',
     *         FILE='UPDATE.')
      ELSEIF (TYPE .EQ. 'OUTPUT') THEN
C        ...OPEN OUTPUT FILE FOR STATE (OUTPUT)
         OPEN(IOUT,STATUS='OLD',ACCESS='SEQ',FORM='UNFORMATTED',
     *         FILE='DCOUT.')
      ELSE
         WRITE (MSG,9520) TYPE
         CALL ABEND (MSG)
      ENDIF
      RETURN
C
600   WRITE (MSG,9600) NIX
      CALL ABEND (MSG)
700   WRITE (MSG,9700)
      CALL ABEND (MSG)
C--------------------------------------------------------------------------
9500  FORMAT (A80)
9520  FORMAT (//10X,'ERROR: INVALID FILE TYPE ---> ',A6)
9600  FORMAT (//10X,'STATUS ERROR.  STATUS CODE IS ',I12///)
9700  FORMAT (//10X,'ERROR READING FILE NAME FROM CONTROL FILE'///)
C
      END
C***********************************************************************
C
      SUBROUTINE ENDFIL (NT,NTAPE,MORE,ISEQ,NUMTAP,NCY,NALL)
C     ... CONTROLS NUMBER OF TAPES TO BE READ FOR EACH STATE
C
C***********************************************************************
C
      COMMON/DEBUG/LIST,TEST,DEBUG
      COMMON/DEVICE/MSG,IPARM,ISUP,IAQ,ICEN,IOUT,IHASH
C
      CHARACTER EDD*8,EDT*8
      LOGICAL MORE
      LOGICAL LIST,TEST,DEBUG
C-----------------------------------------------------------------------
C
      NT = NT + 1
C
      IF (NT .GT. NTAPE) THEN
        WRITE (MSG,510) NTAPE
        CALL ABEND (MSG)
      ENDIF
C
```

```
      IF (NT .LT. NTAPE) THEN
        MORE = .TRUE.
        WRITE (MSG,520) NT,NTAPE
      ELSE
        IF (NCY.GT.0) FRAC=FLOAT(NALL)/FLOAT(NCY)
        CALL ADATE (EDD,EDT)
        WRITE (MSG,530) NT,NTAPE,ISEQ,NCY,NALL,FRAC,EDD,EDT
      NALL=0
      NCY=0
      FRAC=0.
        MORE = .FALSE.
      ENDIF
      NUMTAP = 0
C
      RETURN
C--------------------------------------------------------------------------
  510 FORMAT (//10X,'ERROR: NUMBER OF TAPES SOUGHT EXCEEDS NUMBER ',
     *                  'EXPECTED.'/
     *              10X,'RECORDS PROCESSED FOR THIS STATE TO POINT OF',
     *                  ' ERROR:',I8/)
  520 FORMAT (/10X,'PROGRAM FINISHED READING TAPE ',I2,' OF ',I2//)
  530 FORMAT (/10X,60('-')/
     *         10X,'PROGRAM FINISHED READING TAPE ',I2,' OF ',I2/
     *         10X,'RECORDS PROCESSED FOR THIS STATE = ',I10/
     *         10X,'EMISSION UNIT RECORDS SAVED:        ',I10/
     *         10X,'ALLOCATION UNIT RECORDS SAVED:      ',I10/
     *         10X,'RATIO OF ALLOCATIONS TO EMISSIONS:',F11.3/
     *         10X,'ENDING DATE AND TIME: ',A8,A8/
     *         10X,60('-')/)
C
      END
C***********************************************************************
C
      SUBROUTINE TERM(MSG)
C     ... TERMINATE PROGRAM NORMALLY
C
C***********************************************************************
C
      WRITE (MSG,510)
      STOP '                *****   PROGRAM TERMINATED NORMALLY   *****'
C---------------------------------------------------------------------------
  510 FORMAT(//10X,'*****  PROGRAM TERMINATED NORMALLY  *****')
C
      END
C***********************************************************************
C
      SUBROUTINE ABEND (MSG)
C     ... TERMINATE PROGRAM DUE TO FATAL ERROR
C
C***********************************************************************
C
      WRITE (MSG,510)
      STOP '                        *****   ABNORMAL END   *****'
C----------------------------------------------------------------------
  510 FORMAT(//10X,'***  PROGRAM ENDED DUE TO FATAL ERROR  ***')
C
      END
C----------------- LAST LINE OF SOURCE CODE -------------------------
```

APPENDIX B

PROGRAM LISTING FOR CREATE5A

```
 1:C*****CREATE 5A
 2:C
 3:C      THIS PROGRAM GENERATES AREA SOURCE COUNTY-TO-GRID ALLOCATION FILES--
 4:C      ONE FOR EACH SURROGATE (OUT OF 11) SELECTED (AN EXAMPLE IS TOTAL
 5:C      HOUSING ('TOTHSG')).  THE SOURCE FILE IS GENERATED BY THE PROGRAM
 6:C      CREATE 7A OR CREATE 7B.
 7:C
 8:C      THE USER MAY SELECT 1-11 DIFFERENT FILES BY NAME (IN ANY ORDER).
 9:C      THE PROGRAM WILL CREATE THE APPROPRIATE FILES.  THE NAMES ARE SIX
10:C      CHARACTERS IN LENGTH.  THEY ARE LISTED AND DESCRIBED WITH THE
11:C      FORMAT OF THE FIRST CONTROL RECORD (LINE 110, MAIN PROGRAM).
12:C      SURROGATES TOTPOP AND TOTHSG ARE MANDATORY FOR ALL OF THE
13:C      PRESENT PROGRAMS (GRIDS 'NEROS', 'CONTUS'. 'CONTUSR', AND
14:C      'ENAMAP').  URBPOP MAY BE USEFUL IN DISTRIBUTING POLLUT-
15:C      ANTS CONFINED TO CITIES (.E.G, TAXICAB EXHAUSTS).  THE
16:C      FUEL-ORIENTED HOUSING SURROGATES CAN BE USEFUL WHERE THEY
17:C      ARE USED IN CONJUNCTION WITH INDUSTRIAL POINT SOURCES
18:C      CONTAINING CORRESPONDING FUELS.
19:C
20:C      STRUCTURALLY THIS PROGRAM IS NEW.  FUNCTIONALLY IT DIFFERS FROM
21:C      CREATE 5 IN THAT CREATE 5 COULD CREATE ONLY ONE SURROGATE AT A
22:C      TIME, WHEREAS CREATE 5A CAN CREATE UP TO 11 FILES AT A TIME.
23:C      THE PROGRAM MAY ALSO READ A DATA BASE THAT IS SEGMENTED INTO
24:C      SEPARATE TAPE FILES (STATES).  A RE-START CAPABILITY PERMITS
25:C      THE USER TO PROCESS SMALL NUMBERS OF THESE FILES AT A TIME, OR
26:C      TO RETURN TO FILES PROCESSED EARLIER.
27:C
28:C      FOR THE NEROS GRID PROCESSING, CREATE 5A IN CONTRAST
29:C      TO CREATE 5 PRODUCES A GRID CELL X POLLUTANT SUMMARY
30:C      TABULATION.
31:C
32:C      IT IS ALSO NEWLY POSSIBLE WITH CREATE 5A TO MODIFY THE COMPARISON
33:C      KEY TO SUIT DIFFERENT PURPOSES, AND THE CONVERSION FROM
34:C      FIPS CODE TO NEDS CODE CAN BE OPTIONALLY ACCOMPLISHED.
35:C      FURTHER, WHEREAS CREATE 5 WAS ABLE TO ACCOMMODATE
36:C      ONLY NEROS AND ENAMAP PROJECTS, AND GENERATED GRID CELL COORDIN-
37:C      ATES BASED ON A GRID WITH DIMENSIONS OF 60 COLUMNS AND 42 ROWS,
38:C      AND GEOGRAPHIC LIMITS OF 84W X 45N X 69W X 38N, OTHER GRIDS
39:C      AND GEOGRAPHIC LIMITS ARE ALLOWED IN CREATE 5A, AS DESCRIBED.
40:C      NEXT.
41:C
42:C      THERE IS PROVISION FOR A CONTINENTAL U.S. GRID UNDER THE CODE
43:C      NAME 'CONTUS'.  ITS DIMENSIONS ARE 240 COLUMNS X 156 ROWS.
44:C      NOW ITS GEOGRAPHIC LIMITS ARE 125W X 51N X 65W X 25N.
45:C      HOWEVER THE SOUTHERN LIMIT OF 25N CAUSES CERTAIN KEY
46:C      WEST (FLA) ALLOCATION UNITS TO BE EXCLUDED FROM THE
47:C      GRID.  TO INCLUDE THEM THE NORTHERN LIMIT SHOULD BE REDUCED
48:C      TO 50N AND THE SOUTHERN LIMIT SHOULD BE REDUCED TO 24N.
49:C      THE GRID NAME 'CONTUSR' PROVIDES FOR 50N AND 24N.
50:C      NOTE THAT SUCH A CHANGE WOULD ALSO REQUIRE MODIFYING THE AREA
51:C      ALLOCATION FILE BY ADDING 6 TO EACH ROW NUMBER, AND RMDHS
52:C      FILES USING THE 'CONTUS' GRID AREA ALLOCATION FILE
53:C      WOULD HAVE TO BE REGENERATED UNDER 'CONTUSR'.
54:C
55:C      IF ONE OF THE GRID NAMES, 'NEROS', 'ENAMAP', 'CONTUS', OR
56:C      OR 'CONTUSR', IS GIVEN, THE LIMIT VALUES GIVEN IN THE SECOND
57:C      CONTROL RECORD WILL BE IGNORED.  ANY OTHER NAME WILL ADOPT THE
58:C      VALUES GIVEN IN THE SECOND CONTROL RECORD.
59:C
60:C      EACH OUTPUT FILE MUST BE ABLE TO ACCOMMODATE ONE VARIABLE-
61:C      LENGTH RECORD FOR EACH EMISSION UNIT PARTLY OR WHOLLY IN THE GRID.
62:C      THE 'CONTUS' (CONTIGUOUS UNITED STATES) GRID CONTAINS ABOUT
63:C      3085 EMISSION UNITS (1 FOR EACH COUNTY EXCEPT MASSACHUSETTS,
64:C      WHICH HAS 6 AQCR'S).  EACH OUTPUT RECORD SPACE IN RANDOM ACCESS
65:C      MUST BE LARGE ENOUGH TO ACCOMMODATE THE LARGEST RECORD POSSIBLE.
66:C      THE LARGEST RECORD WOULD BE THAT FOR SAN BERNARDINO COUNTY
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 67:C      IN CALIFORNIA.  IT MUST BE ABLE TO ACCOMMODATE 143 GRID CELLS
 68:C      THAT MAP ONTO IT.  THE MINIMUM NUMBER OF TRACKS MUST BE ABOUT
 69:C      960.  WE RECOMMEND ASSIGNING 1000.
 70:C
 71:C   ***NOTE THAT THERE IS A SINGLE HEADER RECORD AT THE BEGIN-
 72:C      NING OF EACH OUTPUT FILE.  THE RECORD COUNT (AS SHOWN IN
 73:C      THE EMISSION UNIT MESSAGES) WILL THEREFORE BE ONE MORE THAN THE
 74:C      NUMBER OF EMISSION UNITS.  THE TOTAL NUMBER OF RECORDS THAT MUST
 75:C      BE ACCOMMODATED IN THE OUTPUT FILE WHEN THE CONTIGUOUS U.S.
 76:C      STATES GRIDS ARE ALL TO BE GENERATED ('CONTUS' AND 'CONTUSR')
 77:C      IS 3063 (1 FOR THE HEADER, 3056 FOR COUNTIES, 6 FOR THE
 78:C      MASSACHUSETTS AQCR'S THAT TAKE THE PLACE OF COUNTIES).
 79:C      SPACE IN THE DIRECT-ACCESS DISK FILE MUST BE LEFT FOR
 80:C      VARIABLE-LENGTH RECORDS WITH UP TO 150 GRID CELL INTER-
 81:C      SECTIONS.  THE NUMBER OF TRACKS REQUIRED AS A MINIMUM
 82:C      IS DETERMINED AS ABOUT 990.  NUMBER OF TRACKS ACTUALLY ASSIGNED
 83:C      IS 1100, TO ACCOMMODATE 3140 RECORDS (AN ORIGINAL ESTIMATE).
 84:C
 85:C
 86:C      TO PROVIDE FOR CONTROLS, THREE CARD-IMAGE CONTROL RECORDS ARE RE-
 87:C      QUIRED.  A FOURTH IS OPTIONAL FOR TESTING BUT REQUIRED FOR PRODUCTION.
 88:C
 89:C      THE FORMATS OF ALL INPUT AND OUTPUT NONPRINTING FILE RECORDS ARE
 90:C      GIVEN IN APPROPRIATE LOCATIONS WITHIN THE PROGRAM LISTING AS
 91:C      FOLLOWS:
 92:C         FIRST CONTROL:      MAIN        110
 93:C         SECOND CONTROL:     MAIN        140
 94:C         THIRD CONTROL:      MAIN        170
 95:C         FOURTH CONTROL:     MAIN        270      (OPTIONAL)
 96:C         INPUT (ALLOCATION) FILE (FROM CREATE 7A)
 97:C                             ALLOCR      300
 98:C         OUTPUT (COUNTY-TO-GRID) FILE HEADER
 99:C                             MAIN        440
100:C         OUTPUT (COUNTY-TO-GRID) FILE DATA
101:C                             MAIN        595
102:C
103:C      OUTPUT FILE PARAMETERS ARE SPECIFIED IN 'OPEN' STATEMENTS AT:
104:C                             MAIN        421-431
105:C
106:C      INPUT FILE PARAMETERS ARE SPECIFIED IN AN 'OPEN' STATEMENT AT:
107:C                             MAIN        90
108:C
109:C      THIS VERSION OF CREATE5A IS CERTIFIED TO PROCESS CORRECTLY WHEN
110:C      CREATING RECORDS FOR THE 'CONTUS' OR 'CONTUSR' GRIDS.
111:C
112:C
113:C      DESIGNED AND CODED BY JOHN GRAHAM 6/5/84; REVISED 7/30/84, 12/84, 1/85.
114:
115:C
116:C*********************************************************************
117:C
118:C*****INITIALIZATION
119:C
120:       INTEGER        NCOL,NROW,IXO,IYO,IDUM,ID1,ID2,SUM(11),NCELL,MCNTY,
121:     *                ICOL(150),IROW(150),V(150,11),ISEQ,JSEQ,ICL,
122:     *                PMU,EU,PEU,ESU,PESU,JSEQC,ESUC,PFOHSG,FLOHSG,MCD,
123:     *                DATA(11),DATATH,I,L,M,N,LAND,MMAX,IST,ICTY,NF,J,
124:     *                TOT(11),IPR(11),MU,NEDSF,CDATE5,CTIME5,LNG,LAT,
125:     *                PLNG,PLAT,NUMAQ,PNUMAQ,NFILE1,NFILE2,NCURRF,
126:     *                EID1,EID2,NERR,NERRMG,NERRAB,NERRMX,PSEQ,PJSEQ
127:       INTEGER        IFL(60,42),ITT(60,42),INM(11,60,42)
128:       REAL           ALON1,ALAT1,ALAT2,ALON2,DLON,DLAT,ALONR,ALATR,
129:     *                DXY
130:       REAL           WLNG,ELNG,NLAT,SLAT,ALNG,ALAT
131:       LOGICAL        EOF /.FALSE./
132:       LOGICAL        NOFOUR /.FALSE./
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       LOGICAL        MORE /.FALSE./
      CHARACTER*80    CA,CB,CC,CD
      CHARACTER*49    CHAR49
      CHARACTER*20    KEY,PKEY
      CHARACTER*19    CH4
      CHARACTER*16    STATE,STNAM1(55),COUNTY,CN,PSTATE,PCNTY
      CHARACTER*16    ESTATE,ECNTY,AQNAME,RCNTY1,RCNTY2
      CHARACTER*10    LABEL
      CHARACTER*11    CH3
      CHARACTER*9     CH2
      CHARACTER*8     GRDDER,DATE,TIME,GRB,GRC,GRD
      CHARACTER*6     FILE(11),FILENM(11)
      CHARACTER*5     CH5
      CHARACTER*4     CH1,CH6
      CHARACTER*2     CL,PCL,APREVF
      CHARACTER*1     KEYV(20),PSAD,IDA,IDB,IDC,IDD,PKEYV(20),FLAG
C
      EQUIVALENCE     (KEYV(1),KEY,MU),(KEYV(5),EU),(KEYV(9),ESU),
     *                (KEYV(13),NUMAQ),(KEYV(17),JSEQ)
      EQUIVALENCE     (PKEYV(1),PKEY,PMU),(PKEYV(5),PEU),(PKEYV(9),PESU),
     *                (PKEYV(13),PNUMAQ),(PKEYV(17),PJSEQ)
C
C***********************************************************************
C
      DATA            STNAM1 /'ALA ','ALAS','ARIZ','ARK ','CAL ','COL ',
     *                        'CON ','DEL ','DC  ','FLA ','GA  ','HA  ',
     *                        'ID  ','ILL ','IN  ','IOWA','KAN ','KEN ',
     *                        'LA  ','ME  ','MARY','MASS','MICH','MINN',
     *                        'MISS','MO  ','MON ','NEB ','NEV ','NH  ',
     *                        'NJ  ','NM  ','NY  ','NC  ','ND  ','OH  ',
     *                        'OKLA','ORE ','PA  ','PR  ','RH  ','SC  ',
     *                        'SD  ','TENN','TX  ','UTAH','VER ','VA  ',
     *                        'WASH','WVA ','WI  ','WY  ','SMOA','GUAM',
     *                        'VI  '/
      DATA            FILENM /'TOTPOP','RURPOP','URBPOP','TOTHSG',
     *                        'RURHSG','URBHSG','GASHSG','OILHSG',
     *                        'COLHSG','WODHSG','OTHHSG'/
      DATA           IDUM/0/,IX0/0/,IY0/0/,ALONR/0./,ALATR/0./,DXY/0./
      DATA            MCNTY/0/
C
C***********************************************************************
C
C*****OPEN THE CONDENSED CENSUS FILE FROM CREATE 7A/7B.
90    OPEN (10,STATUS='OLD',ACCESS='SEQ',FORM='UNFORMATTED')
C*****DEFINE VERSION LABEL.
      LABEL='CREATE5A-C'
C*****OBTAIN DATE AND TIME OF THIS RUN.
      CALL ADATE (DATE,TIME)
C*****PRINT HEADER RECORD.
      WRITE (6,9100) LABEL,DATE,TIME
9100  FORMAT ('1'/10X,A10,' PROGRAM     CREATE COUNTY-TO-GRID ',
     *   'ALLOCATION RECORDS.'//10X,'DATE AND TIME:  ',2A8/
     *   /10X,'LISTING AND ANALYSIS OF CONTROL RECORDS:'/)
C*****READ FIRST (FILE) CONTROL RECORD.
C
C     FORMAT DESCRIPTION:
C
C     GRDDER     A8     1-8    GRID NAME ('NEROS','CONTUS','CONTUSR',
C                              'ENAMAP', OR SOME OTHER NOT PRESPECIFIED)
C                              ('CONTUS' FOR CONTINENTAL U.S.)
C     IDA        A1      10    IDENTIFIER REQUIRED FOR FIRST CONTROL
C                              RECORD ('A')
C     ESUC       I1      12    SWITCH TO SET KEY EMISSION SUBUNITS TO
C                              ZERO BEFORE SORTS ARE MADE (SUBR 'ALLOC')
C                                  0   NO   (NORMAL)
C                                  1   YES
```

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C     JSEQC      I1    13     SWITCH TO SET KEY SEQUENCE NUMBER FIELD TO
C                             ZERO BEFORE SORTS ARE MADE (SUBR 'ALLOC')
C                                 0   NO   (NORMAL)
C                                 1   YES
C                11A6  15-80  SIX-CHARACTER NAMES OF 1-11 FILES TO BE
C                             CREATED.  NAMES ALLOWED ARE:
C                               TOTPOP   TOTAL POPULATION
C                               RURPOP   RURAL POPULATION
C                               URBPOP   URBAN POPULATION
C                               TOTHSG   TOTAL HOUSING
C                               RURHSG   RURAL HOUSING
C                               URBHSG   URBAN HOUSING
C                               GASHSG   HOUSING HEATED WITH NATURAL GAS
C                               OILHSG   HOUSING HEATED WITH OIL OR
C                                        KEROSENE
C                               COLHSG   HOUSING HEATED WITH COAL OR
C                                        COKE
C                               WODHSG   HOUSING HEATED WITH WOOD
C                               OTHHSG   HOUSING HEATED BY OTHER
C                                        MEANS (E.G., ELECTRICITY)
C                             SEE INTRODUCTION FOR COMMENT ON THESE
C                             SURROGATES.
C
110   READ (7,9110,END=130) CA,GRDDER,IDA,ESUC,JSEQC
9110  FORMAT (A80,T1,A8,T10,A1,T12,2I1)
C
C***********************************************************************
C
C*****DISPLAY THE FIRST CONTROL RECORD IMAGE.
      WRITE (6,9120) CA
9120  FORMAT (10X,'FIRST:   ',A80)
C*****CHECK THE RECORD IDENTIFIER.
      IF (IDA.NE.'A') THEN
         WRITE (6,9122)
9122     FORMAT (10X,'RECORD IDENTIFIER IS NOT ''A''.  TASK ABORTED.'
     *      ///)
         CALL EXIT
      END IF
      GO TO 140
C*****FIRST RECORD NOT FOUND.
130   WRITE (6,9130)
9130  FORMAT (10X,'CONTROL RECORDS ARE MISSING.  TASK ABORTED.'///)
      CALL EXIT
C
C*****READ SECOND (GRID) CONTROL RECORD.
C
C     FORMAT DESCRIPTION:
C
C     GRB        A8      1-8  GRID IDENTIFIER (AS IN FIRST CONTROL)
C     IDB        A1       10  IDENTIFIER REQUIRED FOR SECOND CONTROL
C                             RECORD ('B')
C     NCOL        I4   12-15  NUMBER OF COLUMNS IN GRID
C                             (156 FOR 'CONTUS')
C     NROW        I4   16-19  NUMBER OF ROWS IN GRID
C                             (240 FOR 'CONTUS')
C     ALON1      F7.4  21-27  LONGITUDE WEST OF SOUTHWEST CORNER OF GRID
C                             (125 FOR 'CONTUS')
C     ALAT1      F6.4  29-34  LATITUDE NORTH OF SOUTHWEST CORNER OF GRID
C                             (25 FOR 'CONTUS')
C     ALAT2      F6.4  36-41  LATITUDE NORTH OF NORTHEAST CORNER OF GRID
C                             (51 FOR 'CONTUS')
C     ALON2      F7.4  43-49  LONGITUDE WEST OF NORTHEAST CORNER OF GRID
C                             (65 FOR 'CONTUS')
C     DLON       F7.4  51-57  LONGITUDINAL INCREMENT (DEGREES OF EACH
C                             GRID CELL (.250000 FOR 'CONTUS')
C     DLAT       F6.4  59-64  LATITUDINAL INCREMENT (DEGREES) OF EACH
```

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C                             GRID CELL (.16667 FOR 'CONTUS')
C     NEDSF      I1     66    SWITCH TO CONVERT FROM FIPS TO NEDS CODE
C                                 0   NO (NORMAL)
C                                 1   YES
C     NERRMG     I1     68    SWITCH TO PRINT ERROR MESSAGES
C                                 0   NO
C                                 1   YES (NORMAL)
C     NERRAB     I1     69    SWITCH TO ABORT WHEN LIMIT ON ERROR MES-
C                             SAGES HAS BEEN REACHED
C                                 0   NO
C                                 1   YES (NORMAL)
C     NERRMX     I3  71-73    NUMBER OF ERROR MESSAGES TO PRINT
C                             (0-999)
C
140   READ (7,9140,END=160) CB,GRB,IDB
9140  FORMAT (A80,T1,A8,T10,A1)
C
C***********************************************************************
C
C*****DISPLAY THE SECOND CONTROL RECORD IMAGE.
      WRITE (6,9150) CB
9150  FORMAT (10X,'SECOND:  ',A80)
C*****SCREEN THE SECOND CONTROL RECORD.
C
C*****CHECK THE GRID NAME.
      CALL GRCHK (GRB)
C*****CHECK THE RECORD IDENTIFIER.
      IF (IDB.NE.'B') THEN
         WRITE (6,9152)
9152     FORMAT (12X,'RECORD IDENTIFIER IS NOT ''B''.  TASK ABORTED.'
     *   ///)
         CALL EXIT
      END IF
      GO TO 170
C*****SECOND RECORD NOT FOUND.
160   WRITE (6,9160)
9160  FORMAT (10X,'ONLY FIRST CONTROL RECORD IS PRESENT.  TASK ABORTED.'
     *       ///)
      CALL EXIT
C
C*****READ THIRD (ENAMAP) CONTROL RECORD.
C
C     FORMAT DESCRIPTION:
C
C     GRC        A8    1-8    GRID IDENTIFIER (AS IN FIRST CONTROL)
C     IDC        A1     10    IDENTIFIER REQUIRED FOR THIRD CONTROL
C                             RECORD ('C')
C     NOTE: OTHER ENAMAP CONTROL VARIABLES ARE NOT PROVIDED AT THIS
C      TIME.
170   READ (7,9170,END=190) CC,GRC,IDC
9170  FORMAT (A80,T1,A8,1X,A1)
      WRITE (6,9180) CC
9180  FORMAT (10X,'THIRD:   ',A80)
C*****SCREEN THE THIRD CONTROL RECORD.
C
C*****CHECK THE GRID NAME.
      CALL GRCHK (GRC)
C*****CHECK THE RECORD IDENTIFIER.
      IF (IDC.NE.'C') THEN
         WRITE (6,9182)
9182     FORMAT (12X,'RECORD IDENTIFIER IS NOT ''C''.  TASK ABORTED.'
     *   ///)
         CALL EXIT
      END IF
      GO TO 200
C*****THIRD RECORD IS NOT FOUND.  PRINT ADVISORY MESSAGE.
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190   WRITE (6,9190)
9190  FORMAT (10X,'THIRD (ENAMAP) CONTROL RECORD IS MISSING.  ',
     *              'TASK CONTINUES NEVERTHELESS.'/)
C*****EXTRACT OUTPUT HEADER RECORD DATA FROM THE SECOND CONTROL RECORD.
200   READ (CB,9200) NCOL,NROW,ALON1,ALAT1,ALAT2,ALON2,DLON,
     *   DLAT,NEDSF,NERRMG,NERRAB,NERRMX
9200     FORMAT (T12,2I4,1X,F7.4,2(1X,F6.4),2(1X,F7.4),1X,F6.4,1X,I1,
     *   T68,2I1,1X,I3)
C*****RESET THE PRINT/ERROR MAXIMUM CONDITIONALLY.
      IF ((NERRMX.LT.0).OR.(NERRMX.GT.999999)) NERRMX=0
      IF ((NERRMX.EQ.0).AND.((NERRAB.NE.0).OR.(NERRMG.NE.0))) NERRMX=10
C*****PROGRAM NAME TEST.
      IF (GRDDER.EQ.'NEROS   ') THEN
         WLNG=84.
         ELNG=69.
         NLAT=45.
         SLAT=38.
      ELSE IF (GRDDER.EQ.'CONTUS  ') THEN
         WLNG=125.
         ELNG=65.
         NLAT=51.
         SLAT=25.
      ELSE IF (GRDDER.EQ.'CONTUSR ') THEN
         WLNG=125.
         ELNG=65.
         NLAT=50.
         SLAT=24.
      ELSE IF (GRDDER.EQ.'ENAMAP') THEN
         WLNG=84.
         ELNG=69.
         NLAT=45.
         SLAT=38.
      ELSE
         WLNG=ALON1
         ELNG=ALON2
         NLAT=ALAT2
         SLAT=ALAT1
      END IF
C*****REPLACE CONTROL RECORD VALUES WITH PROGRAM-SPECIFIED VALUES OF
C     GEOGRAPHICAL GRID LIMITS.
      ALON1=WLNG
      ALON2=ELNG
      ALAT2=NLAT
      ALAT1=SLAT
C*****PRINT MESSAGE INDICATING LIMITS USED.
      WRITE (6,9203) GRDDER,WLNG,ELNG,NLAT,SLAT
9203  FORMAT (12X,'PROGRAM NAME: ',15X,A8/
     *        12X,'WESTERNMOST LONGITUDE:   ',F12.4/
     *        12X,'EASTERNMOST LONGITUDE:   ',F12.4/
     *        12X,'NORTHERNMOST LATITUDE:   ',F12.4/
     *        12X,'SOUTHERNMOST LATITUDE:   ',F12.4/)
C
C*****NEDSF TEST
C
C*****BRANCH AND CONTINUE IF GRID GEOGRAPHICAL LIMITS KEEP NUMBER OF
C     ROWS AND COLUMNS WITHIN LIMITS OF 156 AND 240, RESPECTIVELY.
C     OTHERWISE PRINT MESSAGE AND ABORT.
      IF ((INT((WLNG-ELNG)*4.).GT.240).OR.
     *    (INT((NLAT-SLAT)*6.).GT.156)) THEN
         WRITE (6,9205)
9205     FORMAT (10X,'GRID HAS TOO MANY ROWS OR COLUMNS.'/
     *           10X,'TASK ABORTED.'///)
         CALL EXIT
      END IF
      IF ((NEDSF.NE.0).AND.(NEDSF.NE.1)) THEN
         WRITE (6,9210)
```

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9210      FORMAT (12X,'NEDS INSTRUCTION IS NOT 0 OR 1.  TASK ABORTED.'
     *    ///)
          CALL EXIT
      END IF
      IF (NEDSF.EQ.1) WRITE (6,9215)
9215  FORMAT (/12X,'IT IS ASSUMED THAT EMISSION AND ALLOCATION UNITS'/
     *   12X,'ARE TO BE CONVERTED FROM FIPS CODE TO NEDS CODE.'/
     *   12X,'CONVERSION WILL BE MADE.')
      IF (NEDSF.EQ.0) WRITE (6,9216)
9216  FORMAT (12X,'IT IS ASSUMED THAT EMISSION AND ALLOCATION UNITS'/
     *   'ARE IN THE NEDS CODE.')
C*****FILE SETUP AND TEST
      READ (CA,9220) FILE
9220  FORMAT (14X,11A6)
      DO 240 M-1,11
         IF (FILE(M).EQ.'  ') THEN
            MMAX-M-1
            GO TO 250
         END IF
         DO 230 N-1,11
            IF (MMAX.EQ.0) GO TO 227
            DO 225 K-1,MMAX
               IF (FILE(M).EQ.FILE(K)) THEN
                  WRITE (6,9226) FILE(M)
9226              FORMAT (/12X,'FILE NAME ',A6,' IS REFERENCED MORE'
     *               'THAN ONCE.'/12X,'TASK ABORTED.'///)
                  CALL EXIT
               END IF
225         CONTINUE
227         IF (FILE(M).EQ.FILENM(N)) THEN
               IPR(M)-N
              MMAX-MMAX+1
            GO TO 240
            END IF
230      CONTINUE
         WRITE (6,9235) FILE(M),FILENM
9235     FORMAT (12X,'FILE NAME ',A6,' IS INVALID.  VALID NAMES ARE:'/
     *           11X,11A7/12X,'TASK ABORTED.'///)
         CALL EXIT
240   CONTINUE
C
C*****MMAX TEST
C
250   IF (MMAX.EQ.0) THEN
         WRITE (6,9255)
9255     FORMAT (12X,'NO FILE NAME WAS GIVEN.  TASK ABORTED.'///)
         CALL EXIT
      END IF
C
C*****READ FOURTH CONTROL RECORD AFFECTING FILES TO PROCESS.
C     NOTE THAT THIS RECORD IS OPTIONAL.  IF IT IS OMITTED,
C     THE COMPUTER WILL READ FROM THE POINT WHERE THE INPUT
C     TAPE IS POSITIONED.  OUTPUT WILL START AT POSITION 1
C     OF THE RANDOM ACCESS FILE.  ONLY ONE INPUT FILE
C     WILL BE READ.  IF THE FIRST FILE IS GIVEN AS 1, THE
C     TAPE AGAIN WILL NOT BE REWOUND OR REPOSITIONED, BUT
C     THE USER WILL BE ABLE TO SPECIFY THE STARTING POINT.
C     HOWEVER, THE 'LAST RECORD WRITTEN' WOULD STILL BE ZERO (0).
C
C     FORMAT DESCRIPTION:
C
C     GRD        A8   1-8    GRID IDENTIFIER (AS IN FIRST CONTROL)
C     IDD        A1     10   IDENTIFIER FOR FOURTH CONTROL ('D')
C     NFILE1     I2  12-13   TAPE FILE SEQUENCE NUMBER OF FIRST FILE
C                            TO PROCESS (NORMALLY 1 BUT MAY BE 1-50)
C     NFILE2     I2  15-16   TAPE FILE SEQUENCE NUMBER OF LAST FILE
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C                             TO PROCESS (NORMALLY 50 BUT MAY BE 1-50)
C     NLAST      I5   18-22   DIRECT ACCESS REFERENCE NUMBER OF
C                             LAST RECORD IN FILE JUST BEFORE NFILE1
C                             (IF NFILE1 IS 1, THEN NLAST IS 0.)
C     RCNTY1     A16  24-39   FIRST COUNTY IN SERIES FOR WHICH DETAIL
C                             RECORDS ARE DESIRED (LEAVE BLANK IF NONE)
C     RCNTY2     A16  41-56   LAST COUNTY IN SERIES FOR WHICH DETAIL
C                             RECORDS ARE DESIRED (LEAVE BLANK IF NONE)
C
270   READ (7,9270,END-281) CD,GRD,IDD,NFILE1,NFILE2,NLAST,RCNTY1,
     *                      RCNTY2
9270  FORMAT (A80,T1,A8,1X,A1,1X,I2,1X,I2,1X,I5,1X,A16,1X,A16)
C
C**************************************************************************
C
C*****DISPLAY THE FOURTH CONTROL RECORD IMAGE.
      WRITE (6,9271) CD
9271  FORMAT (10X,'FOURTH:  ',A80)
C*****SCREEN FOURTH CONTROL RECORD.
      CALL GRCHK (GRD)
      IF (IDD.NE.'D') THEN
         WRITE (6,9275) IDD
9275     FORMAT (12X,'RECORD IDENTIFIER IS NOT ''D''.  ',
     *            /12X,'TASK ABORTED.'///)
         CALL EXIT
      ENDIF
      IF ((NFILE1.GT.NFILE2).OR.(NFILE1.LT.0).OR.(NFILE2.GT.52)) THEN
         WRITE (6,9277) NFILE1,NFILE2
9277     FORMAT (12X,'FILE NUMBERS ARE INCORRECT: ',2I6
     *           /12X,'TASK ABORTED.'///)
         CALL EXIT
      ENDIF
      IF (NFILE1.EQ.1.AND.NLAST.LT.3501) GO TO 281
      IF (NLAST.LT.10.OR.NLAST.GT.3500) THEN
         WRITE (6,9278) NLAST
9278     FORMAT (12X,'RANDOM ACCESS NUMBER OF LAST RECORD IS OUT OF'
     *           /12X,'RANGE (10-3500) EXPECTED FOR IT: ',I5
     *           /12X,'TASK ABORTED.'///)
         CALL EXIT
      ENDIF
      IF (RCNTY1.GT.RCNTY2) THEN
         WRITE (6,9279) RCNTY1,RCNTY2
9279     FORMAT (12X,'COUNTIES FOR DETAIL LISTINGS IN WRONG ORDER'/
     *           12X,'OR NOT IN FIELDS ASSIGNED:'/
     *           12X,'->',A16,'<-',1X,'->',A16,'<-'/
     *           12X,'TASK ABORTED.'///)
         CALL EXIT
      END IF
      GO TO 281
C*****SET FLAG TO INDICATE NO FOURTH CONTROL RECORD.
280   NOFOUR-.TRUE.
C*****ASSIGN THE RECORD SEQUENCE NUMBER WITH THE LAST VALUE.
C     AS- GIVEN IN THE CONTROL RECORD.
281   NREC-NLAST
C*****BRANCH IF THE FIRST FILE NUMBER IS ZERO OR IF CONTROL RECORD IS
C     ABSENT.
      IF ((NFILE1.EQ.0).OR.NOFOUR) THEN
         WRITE (6,9282)
9282     FORMAT (12X,'DATA ARE TO BE READ FROM FILE AT POSITION WHERE',
     *         /12X,'TAPE WAS FOUND.')
         GO TO 302
      ENDIF
C*****SEEK THE FIRST FILE.
      NNN-NFILE1-1
C*****FOLLOWING SEGMENT IS SKIPPED BECAUSE FACSF CALL FOR MOVE
C     APPEARS NOT TO WORK.  DO NOT DEPEND UPON PROGRAM TO REWIND AND
```

```
C     MOVE TAPE.
      GO TO 288
1     CALL FACSF ('@REWIND ACID*OUT7A. . ')
      WRITE (APREVF,9285) NNN
9285  FORMAT (J2)
      WRITE (6,9286)
9286  FORMAT (10X,'TAPE REWOUND.')
      CALL FACSF ('@MOVE ACID*OUT7A.,'//APREVF//'. . ')
      WRITE (6,9287)
9287  FORMAT (10X,'TAPE MOVED ',I2,' FILES.')
C*****SET CURRENT-FILE POINTER.
288   NCURRF-NFILE1
      WRITE (6,9290) NCURRF
9290  FORMAT (12X,'THE FIRST TAPE FILE TO BE READ IS ',I2/
     *        12X,'PRECEDING FILES IF ANY MUST BE SKIPPED.'/)
      GO TO 302
C***********************************************************************
C
C*****TEST CURRENT FILE NUMBER AGAINST LIMIT AND TERMINATE IF REACHED.
300   IF (NCURRF.EQ.NFILE2) GO TO 700
C*****TERMINATE IF NO FOURTH CONTROL RECORD WAS PRESENT.
      IF (NOFOUR) GO TO 700
C*****INCREMENT COUNTER OF CURRENT FILES.
      NCURRF-NCURRF+1
C*****PRINT MESSAGE INDICATING NUMBER OF FILE CURRENTLY BEING PROCESSED.
302   WRITE (6,9302) NCURRF
9302  FORMAT (/10X,'PROCESSING TAPE FILE ',I2,'   **********'/)
C*****CONSUME FIRST ALLOCATION FILE RECORD (SHOULD BE EMISSION UNIT
C     RECORD).
      CALL ALLOCR
C*****TERMINATE IF THE FILE IS EMPTY.
      IF (EOF) THEN
         WRITE (6,9303)
9303     FORMAT (/10X,'NO RECORD WAS FOUND IN THE FILE.'/
     *           10X,'PROCESSING TERMINATING.'/)
         GO TO 700
      END IF
C*****TEST FOR PROPER LEVEL FOR AN EMISSION UNIT RECORD.
305   CALL ERRCL(CL,ISEQ)
C
C*****EMISSION UNIT RECORD.
C
C*****SAVE STATE AND COUNTY NAMES.
      ESTATE-STATE
      ECNTY-COUNTY
C*****SAVE EMISSION UNIT ID'S.
      EID1-ID1
      EID2-ID2
C*****SAVE EMISSION UNIT TOTALS.
      DO 310 M-1,MMAX
         N-IPR(M)
         TOT(N)-DATA(N)
310   CONTINUE
C*****BRANCH IF THE FIRST FILE HAS ALREADY BEEN PROCESSED.
      IF (MORE) GO TO 510
C
C*****FILE HEADER
C
C*****CONVERT DATE AND TIME OF THE RUN TO STRING FORM.
      READ (DATE,9401) CDATE5
9401  FORMAT (I6)
      READ (TIME,9401) CTIME5
C*****PRINT TITLE FOR FILE HEADERS IF THEY ARE TO BE WRITTEN TO THE
C     MASS STORAGE FILE IN THIS RUN.
      IF (NREC.EQ.0) THEN
         NREC-1
         WRITE (6,9410)
9410     FORMAT (/10X,'FILE HEADERS:'/)
      END IF
C*****OPEN FILES IDENTIFIED IN CONTROL RECORD 'A'.
      DO 450 M-1,MMAX
         N-IPR(M)
         NF-N+10
         GO TO (421,422,423,424,425,426,427,428,429,430,431),N
421      OPEN (11,STATUS-'OLD',ACCESS-'DIR',FORM-'UNFORMATTED',
     *      FILE-FILENM(N),RECL-613,RCDS-3140)
         GO TO 440
422      OPEN (12,STATUS-'OLD',ACCESS-'DIR',FORM-'UNFORMATTED',
     *      FILE-FILENM(N),RECL-613,RCDS-3140)
         GO TO 440
423      OPEN (13,STATUS-'OLD',ACCESS-'DIR',FORM-'UNFORMATTED',
     *      FILE-FILENM(N),RECL-613,RCDS-3140)
         GO TO 440
424      OPEN (14,STATUS-'OLD',ACCESS-'DIR',FORM-'UNFORMATTED',
     *      FILE-FILENM(N),RECL-613,RCDS-3140)
         GO TO 440
425      OPEN (15,STATUS-'OLD',ACCESS-'DIR',FORM-'UNFORMATTED',
     *      FILE-FILENM(N),RECL-613,RCDS-3140)
         GO TO 440
426      OPEN (16,STATUS-'OLD',ACCESS-'DIR',FORM-'UNFORMATTED',
     *      FILE-FILENM(N),RECL-613,RCDS-3140)
         GO TO 440
427      OPEN (17,STATUS-'OLD',ACCESS-'DIR',FORM-'UNFORMATTED',
     *      FILE-FILENM(N),RECL-613,RCDS-3140)
         GO TO 440
428      OPEN (18,STATUS-'OLD',ACCESS-'DIR',FORM-'UNFORMATTED',
     *      FILE-FILENM(N),RECL-613,RCDS-3140)
         GO TO 440
429      OPEN (19,STATUS-'OLD',ACCESS-'DIR',FORM-'UNFORMATTED',
     *      FILE-FILENM(N),RECL-613,RCDS-3140)
         GO TO 440
430      OPEN (20,STATUS-'OLD',ACCESS-'DIR',FORM-'UNFORMATTED',
     *      FILE-FILENM(N),RECL-613,RCDS-3140)
         GO TO 440
431      OPEN (21,STATUS-'OLD',ACCESS-'DIR',FORM-'UNFORMATTED',
     *      FILE-FILENM(N),RECL-613,RCDS-3140)
C*****   WRITE HEADER RECORD TO FILE ONLY IF THE RECORD NUMBER
C        IS ONE (1).
440      IF (NREC.GT.1) GO TO 450
         WRITE (NF'NREC) CDATE5,CTIME5,GRDDER,NCOL,NROW,
     *                   ALON1,ALAT1,ALAT2,
     *                   ALON2,DLON,DLAT,ALONR,ALATR,DXY,IXO,IYO,IDUM
         WRITE (6,9445) FILENM(N),CDATE5,CTIME5,GRDDER,NCOL,NROW,
     *                  ALON1,ALAT1,
     *                   ALAT2,ALON2,DLON,DLAT,ALONR,ALATR,DXY,IXO,IYO
9445     FORMAT (10X,A6,2(1X,J6),1X,A8,2I4,F10.5,2F9.5,F10.5,2F9.5,
     *   2F7.5,F8.5,2I3)
450   CONTINUE
      WRITE (6,9455)
9455  FORMAT (/)
C
C**********************************************************************
C
C*****PROCESS
C
C*****PRINT PROCESS SECTION HEADER.
      WRITE (6,9500)
9500  FORMAT (/10X,'RECORD PROCESSING MESSAGES:'//)
C
C*****PROCESS LOOP
C
510   CONTINUE
```

```
C
C**********************************************************************
C
C*****EMISSION BLOCK INPUT
C
C*****EMISSION BLOCK INPUT LOOP ('WHILE PKEY-KEY')
C
515   CONTINUE
C
C**********************************************************************
C
C*****CONSUME NEXT ALLOCATION FILE RECORD.
      CALL ALLOCR
C*****BRNACH IF THE END OF THE ALLOCATION FILE HAS BEEN REACHED.
      IF (EOF) GO TO 550
C*****PROCESS ALLOCATION FILE RECORD.
C
C*****TEST GRID CELL COORDINATES.
      ALAT-FLOAT(LAT)/10000.
      ALNG-FLOAT(LNG)/10000.
      IF ((ALNG.LE.ELNG).OR.(ALNG.GT.WLNG).OR.(ALAT.LT.SLAT).OR.
     *    (ALAT.GE.NLAT)) THEN
          CALL ERRIJ
      END IF
C*****BRANCH IF RECORD DOES NOT REPRESENT AN ALLOCATION UNIT.
C     OTHERWISE FIND AND INCREMENT ACCUMULATORS FOR GRID CELL
C     WITHIN WHICH THE ALLOCATION UNIT CENTROID FALLS.
C     IF ((PKEY.EQ.KEY).AND..NOT.EOF) THEN
C*****SKIP IF NOT ALLOCATION UNIT RECORD.
      IF ((ICL.GT.12).AND..NOT.EOF) THEN
C*****   ALLOCATION UNIT RECORD
C
C*****   FIND COLUMN AND ROW OF GRID CELL TO WHICH CENTROID BELONGS.
         KCOL-INT((WLNG-ALNG)*4.)+1
         KROW-INT((ALAT-SLAT)*6.)+1
C*****   BRANCH IF TABLE IS EMPTY.  SEEK GRID CELL IN REFERENCE
C        TABLE OTHERWISE.
         IF (L.EQ.0) GO TO 517
         DO 516 K-1,L
            IF ((KCOL.EQ.ICOL(K)).AND.(KROW.EQ.IROW(K))) THEN
               LP-K
               GO TO 519
            END IF
516      CONTINUE
C*****   GRID CELL IS NOT YET IN TABLE.  BRANCH IF TABLE IS NOT FULL.
C        ABORT OTHERWISE.
         IF (L.EQ.150) THEN
            WRITE (6,9518) ECNTY
9518        FORMAT (/10X,'LIMIT OF 150 GRID CELLS INTERSECTING ONE ',
     *                   'EMISSION UNIT '/
     *        10X,'IS EXCEEDED IN ',A16/
     *        10X,'TASK ABORTED.'///)
         END IF
C*****   ADD NEW GRID CELL TO TABLE.
517      L-L+1
         LP-L
         ICOL(LP)-KCOL
         IROW(LP)-KROW
519      DO 520 M-1,MMAX
            N-IPR(M)
            V(LP,N)-V(LP,N)+DATA(N)
            SUM(N)-SUM(N)+DATA(N)
520      CONTINUE
C*****   FOR DIAGNOSTIC PURPOSES PRINT THE LOCATION-TO-GRID CELL
C        CONVERSIONS AND THE ACCUMULATORS FOR THE MMAX FILES OF
C        THE RANGE OF COUNTIES DESIGNATED IN CONTROL RECORD FOUR.
```

```
         IF ((ECNTY.GE.RCNTY1).AND.(ECNTY.LE.RCNTY2)) THEN
            WRITE (6,9522) ISEQ,ICL,ALNG,ALAT,KCOL,KROW,
     *                       (DATA(IPR(M)),M-1,MMAX)
9522        FORMAT (8X,2I4,2F9.4,2I4,1X,11I8)
         END IF
         IF (GRDDER.NE.'NEROS   ') GO TO 525
C*****   INCREMENT ACCUMULATORS OF SUPPRESSION AND TOTAL ENTRIES AND
C        OF THE TOTAL COUNT.  (APPLIES ONLY TO NEROS GRID RECORDS.)
         I-ICOL(LP)
         J-IROW(LP)
         IFL(I,J)-IFL(I,J)+FLOHSG
         ITT(I,J)-ITT(I,J)+1
         DO 523 M-1,MMAX
            N-IPR(M)
            INM(N,I,J)-INM(N,I,J)+DATA(N)
523      CONTINUE
525      CONTINUE
         GO TO 515
      END IF
C
C***********************************************************************
C
C*****EMISSION BLOCK OUTPUT
C
C*****PROCESS ACCORDING TO WHETHER ALLOCATION UNIT RECORDS ARE PRESENT
C     OR NOT.
550   IF (L.NE.0) GO TO 560
C*****ONLY EMISSION TOTAL RECORDS ARE PRESENT.  ALLOCATION IS AT THE
C     HIGHEST LEVEL (11 OR 12).
      NCELL-1
      L-1
      DO 555 M-1,MMAX
         N-IPR(M)
         SUM(N)-DATA(N)
         V(1,N)-DATA(N)
555   CONTINUE
      GO TO 590
C
C*****ONE OR MORE ALLOCATION RECORDS ARE PRESENT (ALLOCATION IS BELOW
C     HIGHEST LEVEL (11 OR 12).
C
C*****COMPARE TOTALS WITH SUMS.  (FOR EACH SURROGATE, COMPARE THE TOTAL
C     FOUND IN THE EMISSION UNIT RECORD FOR THE BLOCK WITH THE SUM OF
C     THE EMISSIONS FOUND IN THE 'L' ALLOCATION UNIT RECORDS.)
C
C  ***NOTE:  AN ALLOCATION RECORD WITH THE TOTAL OCCUPIED HOUSING
C            COUNT SUPPRESSED WILL CAUSE THE PROGRAM TO PROVIDE A
C            WARNING MESSAGE HERE.  UP TO 20 WARNING MESSAGES CAN
C            BE TOLERATED.  NO CORRECTIVE ACTION IS TAKEN FOR THESE
C            OR OTHER CASES WHERE THERE ARE DISAGREEMENTS BETWEEN
C            SUMMED ALLOCATION AND EMISSION UNIT TOTALS.
C
560   DO 580 M-1,MMAX
         N-IPR(M)
         IF (TOT(N).NE.SUM(N)) THEN
            WRITE (6,9570) ESTATE,ECNTY,FILENM(N),SUM(N),TOT(N)
9570        FORMAT (10X,'WARNING: FOR STATE/COUNTY/FILE ',
     *                  A16,1X,A16,1X,A6/
     *              20X,'ALLOCATION RECORD SUM AND EMISSION UNIT ',
     *                  'TOTAL DISAGREE.'/
     *              20X,'ALLOCATION RECORD SUM:     ',I12/
     *              20X,'EMISSION UNIT TOTAL:       ',I12)
         END IF
580   CONTINUE
C
C*****PRODUCE DIRECT-ACCESS EMISSION BLOCK (COUNTY OR AQCR-TO-GRID)
```

```
C     RECORDS.
C
C*****INCREMENT COUNTER OF OUTPUT RECORDS.
590   NREC-NREC+1
C*****SAVE NUMBER OF ALLOCATIONS FOUND.
      NCELL-L
C*****WRITE ONE RECORD TO EACH OF THE 'MMAX' FILES.
      DO 600 M-1,MMAX
            N-IPR(M)
            NF-N+10
            WRITE (NF'NREC) EID1,EID2,ESTATE,ECNTY,SUM(N),NCELL,
     *                      (ICOL(L),IROW(L),L-1,NCELL),
     *                      (V(L,N),L-1,NCELL),
     *                      (FLOAT(V(L,N))/SUM(N),L-1,NCELL)
600   CONTINUE
C*****PRINT EMISSION UNIT RECORD MESSAGE.  INCREMENT COUNTER.
601   WRITE (6,9601) NREC,EID1,EID2,ESTATE,ECNTY,NCELL,
     *   (TOT(IPR(M)),M-1,MMAX)
9601  FORMAT (8X,I5,2I6,1X,A4,1X,A16,I3,3I8,3I6,3I5,2I4)
      MCNTY-MCNTY+1
C*****BRANCH IF END OF INPUT FILE HAS NOT BEEN REACHED.
C     OTHERWISE RESET ACCUMULATORS AND FLAGS FOR NEXT FILE.
      IF (EOF) THEN
         WRITE (6,9602) ESTATE,NREC
9602     FORMAT (/10X,'FILE FOR ',A16,' ENDED WITH RECORD NO. ',I6//)
         DO 604 M-1,MMAX
            N-IPR(M)
            TOT(N)-0
            SUM(N)-0
            DO 603 L-1,NCELL
               V(L,N)-0
603         CONTINUE
604      CONTINUE
         EOF-.FALSE.
         L-0
         NCELL-0
         MORE-.TRUE.
         GO TO 300
      END IF
C
C***********************************************************************
C
C*****PROCESS THE EXPECTED NEW EMISSION UNIT RECORD.
C
C*****TEST FOR PROPER LEVEL FOR EMISSION UNIT RECORD.
607   CALL ERRCL(CL,ISEQ)
C*****REINITIALIZE ACCUMULATORS AND OTHER VARIABLES.
C
C*****SAVE STATE AND COUNTY NAMES OF NEW EMISSION UNIT.
      ESTATE-STATE
      ECNTY-COUNTY
C*****SAVE ID'S OF NEW EMISSION UNIT.
      EID1-ID1
      EID2-ID2
C*****SAVE TOTALS OF NEW EMISSION UNIT.
      DO 608 M-1,MMAX
         N-IPR(M)
         TOT(N)-DATA(N)
608   CONTINUE
C*****RESET TO ZERO THE POPULATION AND HOUSING ACCUMULATORS FOR THE 'MMAX'
C     FILES.
      DO 620 M-1,MMAX
         N-IPR(M)
         DO 610 L-1,NCELL
            V(L,N)-0
610      CONTINUE
```

```
         SUM(N)=0
620   CONTINUE
C*****RESET TO ZERO THE COUNTERS OF GRID CELLS MAPPING PARTIALLY/WHOLLY
C     INTO A GIVEN EMISSION UNIT AREA.
      L=0
      NCELL=0
      GO TO 510
C
C***********************************************************************
C
C*****TERMINATION
700   WRITE (6,9700) ISEQ,NREC,NERR
9700  FORMAT (/10X,'PROCESSING COMPLETE.'/
     *         10X,'RECORDS READ:',T30,I8/
     *         10X,'RECORDS WRITTEN:',T30,I8/
     *         10X,'NO. OF ALLOCATION UNIT RECORDS NOT IN GRID:',
     *         /T30,I8/)
      IF (GRDDER.NE.'NEROS   ') GO TO 740
      WRITE (6,9710) (FILENM(IPR(M)),M=1,MMAX)
9710  FORMAT (10X,'GRID CELL SUPPRESSION AND TOTAL ENTRIES AND COUNTS:'/
     *        10X,'COL ROW    SUPPR   TOTAL   COUNTS:'/
     *        37X,11(A6,3X))
      WRITE (6,9711)
9711  FORMAT (' ')
      DO 730 I=1,60
         DO 730 J=1,42
            IF (ITT(I,J).GT.0) WRITE (6,9720) I,J,IFL(I,J),ITT(I,J),
     *                                (INM(IPR(M),I,J),M=1,MMAX)
9720                           FORMAT (10X,I3,I4,2(3X,I5),11I9)
730   CONTINUE
740   WRITE (6,9740)
9740  FORMAT (/)
      CALL EXIT
C
C***********************************************************************
C
      SUBROUTINE GRCHK (GRID)
C
C*****SUBROUTINE GRCHK COMPARES GRID NAME OF CONTROL RECORDS BEYOND
C     THE FIRST WITH THE ONE FOUND IN THE FIRST.  IF THERE IS
C     A DISCREPANCY, THE TASK IS TERMINATED.
C
      CHARACTER*8 GRID
C
C***********************************************************************
C
      IF (GRID.NE.GRDDER) THEN
         WRITE (6,9100) GRID,GRDDER
9100     FORMAT (12X,'PROGRAM IDENTIFIER ',A8/
     *           12X,'DOES NOT AGREE WITH IDENTIFIER ',A8/
     *           12X,'IN THE FIRST CONTROL RECORD.'/
     *           12X,'TASK ABORTED.'///)
         CALL EXIT
      END IF
      RETURN
C
C***********************************************************************
C
      SUBROUTINE ALLOCR
C
C*****READ ALLOCATION RECORD AND SCREEN VALUES.
C
C
C***********************************************************************
C
C*****SAVE TEST VALUES.
```

```
      PKEY=KEY
      PCL=CL
      PSTATE=STATE
      PCNTY=COUNTY
      PFOHSG=FLOHSG
      PLNG=LNG
      PLAT=LAT
      PSEQ=ISEQ
C*****READ ALLOCATION RECORD.
C
C    CREATE5A DATA FIELD  CENSUS
C    VARIABLE TYPE POSIT. VARIABLE   DESCRIPTION
C    ------------------------------------------------------------------
C    KEY C*16/I    1-4   MU         MAJOR UNIT (E.G., STATE)
C                  5-8   EU         EMISSION UNIT (E.G., COUNTY, AQCR)
C                  9-12  ESU        EMISSION SUBUNIT OR BLANK
C                 13-16  NUMAQ      SPECIAL EMISSION UNIT VALUE
C                                   (E.G., AQCR)
C             R   17-20  JSEQ       CREATE 7A INPUT SEQUENCE NUMBER
C                                   OR ZERO (0) (ZERO INDICATES SORTED
C                                   GENERATED EMISSION UNIT RECORDS)
C    CHAR49 C*49/C 21-28 HDATE      DATE OF HASH TABLE CREATION
C                 29-36  HTIME      TIME OF HASH TABLE CREATION
C                 37-44  RDATE      DATE OF CREATE7A RUN
C                 45-52  RTIME      TIME OF CREATE7A RUN
C            C*2  54-54  AYR        LAST TWO DIGITS OF CENSUS YEAR
C            C*5  55-59  AFID       FIVE-CHARACTER CENSUS FILE I.D.
C                                   ('STF3A')
C            C*10 60-69  LABEL      PROGRAM IDENTIFIER
C                                   (E.G., 'CREATE7A-B')
C    ICL      I   70-73  SUMRYLVL   CENSUS SUMMARY LEVEL
C    CH1      C*4 74-75  URBARURL   URBAN-RURAL CLASSIFICATION CODE
C                 76-77  SMSACOM    INSIDE/OUTSIDE SMSA'S COMPONENT
C                                   (SUPPOSEDLY BLANK IN STF3 FILE)
C    PSAD     C*1  78    PSAD       POLITICAL/STATISTICAL AREA
C                                   DESCRIPTION CODE
C    CH2 C*9/C     79    REGION     REGION CODE  (LEVEL 02)
C                                   (EACH RECORD IS ASSIGNED TO A RE-
C                                   GION BUT THERE IS NO LEVEL 02
C                                   RECORD AS SUCH IN THE HEAD
C                                   SECTION OF THE FILE.)
C                 80-81  STATEGEO   CENSUS STATE CODE (MASS. = 14)
C                                   (LEVEL 04)
C                 82-83  STATE      FIPS STATE CODE (MASS. = 25)
C                                   (LEVEL 04)
C                 84-87  SMSA       STANDARD METROPOLITAN STATISTICAL
C                                   AREA (SMSA) CODE  (LEVEL 07)
C                                   (MAY ALWAYS BE BLANK IN RECORDS
C                                   FOUND IN THE HEAD SECTION OF THE
C                                   FILE. NO LEVEL 07 RECORD AS SUCH
C                                   IS FOUND IN THE HEAD SECTION OF THE
C                                   FILE.)
C    ICTY     R   88-91  COUNTY     FIPS COUNTY CODE  (LEVEL 11)
C    CH3 C*14/C   92-95  MCD        MINOR CIVIL DIVISION (MCD) OR
C                                   CENSUS COUNTY DIVISION (CCD) CODE
C                                   (LEVEL 12)  (USU. TOWNSHIP)
C                 96-99  PLACE      CENSUS PLACE, COMPLETE  (LEVEL 13)
C                100-105 TRACT      CENSUS TRACT, COMPLETE  (LEVEL 14)
C                106     BLKGRP     CENSUS BLOCK GROUP, COMPLETE
C                                   (LEVEL 15)
C    CH4 C*19/C  107     PARTPLAC   CENSUS PLACE, PARTIAL  (LEVEL 13)
C                108     PATTRCT    CENSUS TRACT, PARTIAL  (LEVEL 14)
C                109     PARTBLK    CENSUS BLOCK, PARTIAL  (LEVEL 15)
C                110     EDIND      CENSUS ENUMERATION DISTRICT
C                                   INDICATOR  (LEVEL 16)
C                111-114 EDNUMBER   CENSUS ENUMERATION DISTRICT
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C                                    NUMBER
C                  115    EDSUFFIX   CENSUS ENUMERATION DISTRICT
C                                    SUFFIX
C                 116-117 SCSA       FIPS STANDARD CONSOLIDATED STATIS-
C                                    TICAL AREA (SCSA) CODE
C                 118-121 URBAREA    URBANIZED AREA (UA) CODE
C                 122-125 MCDSEQNO   MCD SEQUENCE NUMBER
C    CH5      C*5 126     SMSASIZE   STANDARD METROPOLITAN STATISTICAL
C                                    AREA (SMSA) SIZE CODE
C                  127    UATYPE     URBANIZED AREA (UA) TYPE
C                  128    UASIZE     URBANIZED AREA (UA) SIZE CODE
C                  129    PLACDESC   PLACE DESCRIPTION CODE
C                  130    PLASZE     PLACE SIZE CODE
C    CH6      C*4  131    XCITY      EXTENDED CITY INDICATOR CODE
C                  132    CBD        CENTRAL BUSINESS DISTRICT CODE
C                 133-134 MCDCCDSZ   MCD/CCD SIZE CODE
C    LNG      I   135-138 LONGITUD   LONGITUDE OF CENTROID
C                                    (TEN-THOUSANDTHS OF DEGREES)
C                                    (SUPPOSEDLY BLANK IN STF3 FILE)
C    LAT      I   139-142 LATITUDE   LATITUDE OF CENTROID
C                                    (TEN-THOUSANDTHS OF DEGREES)
C                                    (SUPPOSEDLY BLANK IN STF3 FILE)
C    LAND     I   143-146 LAND       LAND AREA (SQUARE MILES)
C    AQNAME  C*16 147-162            HIGHER CATEGORY NAME
C    CN       A16 163-178 AREANAME   CATEGORY NAME
C    FLAG     C*1  179    SUPFLG08   OCCUPIED HOUSING UNIT SUPPRESSION
C                                    FLAG
C    DATA(M)  11I 180-223 TABX(N)    TABULATED DATA:
C
C                  CREATE5A  CREATE7A  CENSUS    DESCRIPTION
C                  -----------------------------------------------------
C                  DATA(1)   DATA(1)   TAB1(1)   TOTAL POPULATION
C                  DATA(2)   DATA(2)   TAB1(3)   RURAL POPULATION
C                  DATA(4)   DATA(3)   TAB4(1)   TOTAL HOUSING
C                  DATA(5)   DATA(4)   TAB4(3)   RURAL HOUSING
C                  DATA(6)*  DATA(5)   TAB11(3)  VACANT HOUSING
C                  DATA(7)   DATA(6)   TAB112(1) GAS-FUEL HOUSING
C                  DATA(8)   DATA(7)   TAB112(4) OIL, KEROSENE HOUSING
C                  DATA(9)   DATA(8)   TAB112(5) COAL, COKE HOUSING
C                  DATA(10)  DATA(9)   TAB112(6) WOOD FUEL HOUSING
C                  DATA(11)  DATA(10)  TAB112(7) OTHER-FUEL HOUSING
C
C    * DATA(6) IS LATER MODIFIED IN STATEMENT 345 TO CONTAIN URBAN
C              HOUSING COUNTS.
C      DATA(3) IS DEFINED IN STATEMENT 340 AS URBAN POPULATION.
C
      READ (10,END=350,ERR=360) KEY,CHAR49,
     *                          ICL,CH1,PSAD,CH2,ICTY,MCD,CH3,CH4,CH5,
     *                          CH6,LNG,LAT,LAND,AQNAME,CN,FLAG,
     *                          (DATA(I),I=1,2),(DATA(I),I=4,11)
C
C***********************************************************************
C
C*****INCREMENT COUNTER OF RECORDS READ.
      ISEQ=ISEQ+1
      IF (ISEQ.LT.4) THEN
        WRITE (6,9301) ISEQ,MU,EU,ESU,NUMAQ,JSEQ,
     *                 ICL,CH1,PSAD,CH2,ICTY,MCD,CH3,CH4,CH5,
     *                 CH6,LNG,LAT,LAND,AQNAME,CN,FLAG,
     *                 DATA
9301    FORMAT  (/10X,'INTERPRETATION OF RECORD ',I4,':'/
     *           10X,'  MU.......',J4/
     *           10X,'  EU.......',J4/
     *           10X,'  ESU......',J4/
     *           10X,'  NUMAQ....',J2/
     *           10X,'  JSEQ.....',J9/
     *          10X,'  ICL......',J2/
     *          10X,'  CH1......',A4/
     *          10X,'  PSAD.....',A1/
     *          10X,'  CH2......',A9/
     *          10X,'  ICTY.....',J4/
     *          10X,'  MCD......',J3/
     *          10X,'  CH3......',A11/
     *          10X,'  CH4......',A19/
     *          10X,'  CH5......',A5/
     *          10X,'  CH6......',A4/
     *          10X,'  LNG......',I8/
     *          10X,'  LAT......',I8/
     *          10X,'  LAND.....',I8/
     *          10X,'  AQNAME...',A16/
     *          10X,'  CN.......',A16/
     *          10X,'  FLAG.....',A1/
     *          10X,'  DATA.....',5I10/21X,5I10/21X,I10/)
      ENDIF
C*****CREATE NUMERIC FROM CHARACTER STRING 'FLAG'.
      READ (FLAG,9302) FLOHSG
9302  FORMAT (J1)
C*****CREATE CHARACTER STRING 'CL' FROM NUMERIC.
      WRITE (CL,9303) ICL
9303  FORMAT (J2)
C*****RESET KEY EMISSIONS SUBUNIT ID TO ZERO IF ESUC SWITCH IS 1.
      IF (ESUC.EQ.1) ESU-0
C*****RESET KEY SEQUENCE NUMBER TO ZERO IF JSEQC SWITCH IS 1.
      IF (JSEQC.EQ.1) JSEQ-0
C*****FIND COUNTY.
C     READ (CTY,9305) ICTY
9305  FORMAT (I4)
C*****FIND STATE.
      READ (CH2,9310) IST
9310  FORMAT (3X,I2)
C*****REPLACE STATE AND COUNTY CODES IF NEDSF-1.
C     (IF NEDSF-1, IT IS ASSUMED THAT INCOMING CODE IS FIPS BUT THE
C     OUTGOING CODE SHOULD BE NEDS/SAROAD.)
      IF (NEDSF.EQ.1) CALL INDEX(MU,EU)
      IF ((MU.LT.1).OR.(MU.GT.55)) THEN
         WRITE (6,9312) MU,EU,CN,ISEQ
9312     FORMAT (/10X,'MAJOR UNIT (STATE) CODE IS OUT OF RANGE: ',I4/
     *          10X,'EMISSION UNIT (COUNTY, AQCR) IS:',I6,2X,A16/
     *          10X,'RECORD SEQUENCE NO. IS:',I8/)
         CALL EXIT
      END IF
C*****FIND MAJOR/MINOR EMISSION UNIT I.D.
      ID1-MU*10000+EU
C*****FIND STATE/COUNTY I.D.
      ID2-IST*10000+ICTY
      IF (ESU.GT.0) THEN
         ID1-ID1*1000+ESU
         ID2-ID2*1000+ESU
      END IF
C*****IDENTIFY STATE NAME BY NEDS CODE NUMBER.
C     (NOTE: THE NAME IS CONSISTENT WITH PREVIOUS USE.  IT IS RECOGNIZED
C     THAT SOME OF THE STATE ABBREVIATIONS ARE NOT STANDARD.)
      STATE-STNAM1(MU)
C*****SAVE COUNTY NAME.
      COUNTY-CN
C*****OBTAIN TOTAL HOUSING BY SUMMING VACANT AND OCCUPIED COUNTS.
      DATATH-0
      DO 320 I-6,11
         DATATH-DATATH+DATA(I)
320   CONTINUE
C*****ABORT IF SUM OF VACANT AND OCCUPIED HOUSING EXCEEDS TOTAL.
      IF (DATA(4).LT.DATATH) THEN
```

```
         WRITE (6,9330) DATA(4),DATATH
9330     FORMAT (/10X,'TOTAL HOUSING VALUE IS LESS THAN THE SUM OF ',
     *                  'THE HOUSES WITH FUEL: ',2I15/10X,'TASK ABORTED.'
     *                  ///)
         CALL EXIT
      END IF
C*****OBTAIN URBAN POPULATION.
340   DATA(3)=DATA(1)-DATA(2)
C*****OBTAIN URBAN HOUSING.
345   DATA(6)=DATA(4)-DATA(5)
      RETURN
C
C*****END OF FILE
C
C*****SET END-OF-FILE FLAG AND RETURN.
350   EOF=.TRUE.
      RETURN
C
C*****ERROR
C
C*****PRINT ERROR MESSAGE AND ABORT.
360   WRITE (6,9360) ISEQ+1,MU,EU,ESU,CH2
9360  FORMAT (/10X,'ERROR IN READ OF ALLOCATION RECORD ',I10/
     *         10X,'DATA READ (MAJOR UNIT, EMISSION UNIT, EMISSION ',
     *         'SUBUNIT, REGION CODE):'/
     *         10X,J2,1X,J4,1X,J3,1X,A9/
     *         10X,'TASK ABORTED.'///)
      CALL EXIT
C
C***********************************************************************
C
      SUBROUTINE ERRCL(CL,ISEQ)
C
C*****TEST FOR ERROR IN SUMMING LEVEL FOR EMISSION UNIT RECORD.
C     (FROM MAIN 305, 607)
C
      CHARACTER*2    CL
      INTEGER        ISEQ
C
C***********************************************************************
C
C*****RETURN IF SUMMARY LEVEL CODE IS 11 (COUNTY) OR 12 (TOWNSHIP).
      IF ((CL.EQ.'11').OR.(CL.EQ.'12')) RETURN
C*****SUMMARY LEVEL CODE IS NOT 11 OR 12.  ERROR EXISTS.  PRINT
C     MESSAGE AND ABORT.
      WRITE (6,9320) ISEQ,CL
9320  FORMAT (/10X,'WRONG SUMMING LEVEL FOR EMISSION UNIT ',
     *   'IN RECORD ',I6,': ',A2/
     *   10X,'TASK ABORTED.'///)
      CALL EXIT
C
C***********************************************************************
C
      SUBROUTINE ERRIJ
C
C     THIS SUBROUTINE PRINTS AN ERROR MESSAGE AND/OR TERMINATES THE
C     PROGRAM ACCORDING TO THE CONDITIONS OF CERTAIN PARAMETERS:
C        IF THE FLAG 'NERRMG' IS SET NONZERO, IT PRINTS UP TO
C           'NERRMX' MESSAGES.
C        IF THE FLAG 'NERRAB' IS SET NONZERO, IT ABORTS THE PROGRAM
C           AFTER 'NERRMX' ERRORS.
C     THESE PARAMETERS MAY BE SPECIFIED IN THE GRID CONTROL RECORD.  IF
C     'NERRMX' IS GIVEN AS BLANK OR ZERO BUT EITHER OF THE FLAG PAR-
C     AMETERS IS GIVEN AS NONZERO, THEN 'NERRMX' WILL BE SET TO 10.
C
C***********************************************************************
```

```
C
       IF (NERRMG.EQ.0) GO TO 805
       WRITE (6,9800) ISEQ,LAT,LNG,GRDDER
9800   FORMAT (10X,'RECORD ',I6,' WITH LATITUDE ',I6,
     *   ' AND LONGITUDE ',
     *      I7,' IS NOT IN THE ',A8,' GRID.')
805    IF (NERR.GE.NERRMX) GO TO 807
       NERR=NERR+1
       RETURN
807    IF (NERRAB.EQ.0) RETURN
810    WRITE (6,9810)
9810   FORMAT (/10X,'TASK ABORTED.'///)
       CALL EXIT
C
C*********************************************************************
C
       SUBROUTINE INDEX (IST,ICY)
C
C*****INDEX REPLACES FIPS STATE AND COUNTY CODES WITH NEDS/SAROAD CODES.
C      IT IS USED ONLY IF THE SUBSTITUTION WAS NOT MADE IN CREATE 7A OR
C      CREATE 7B.  THE CHAIN2 SUBROUTINE IS FOUND IN THE NEROS*UTILITY1
C      FILE.  IT RETURNS AN ELEMENT POINTER THAT IS BASED ON A HASHING
C      ALGORITHM.  THE ELEMENT POINTER IS THE VARIABLE II.
C
C*********************************************************************
C
       INTEGER         ICNTY,JCNTY,IST,JST,NCNTY7,LKEY7,NSIZE7,NPRMT7,
     *                 IT7(3,4001),ICY,IOSTAT
       REAL            CDATE7(2),CTIME7(2)
       LOGICAL         INSERT,FIRST
       COMMON /HASH1/  CDATE7,CTIME7,NCNTY7,LKEY7,NSIZE7,NPRMT7,IT7
       DATA            INSERT /.TRUE./,FIRST/.TRUE./
C
C*********************************************************************
C
       IF (FIRST) THEN
          OPEN (9,STATUS='OLD',ACCESS='SEQ',FORM='UNFORMATTED',
     *       FILE='FIPS-NEDS-H',IOSTAT=IOSTAT)
          READ (9,END=406,ERR=407) CDATE7,CTIME7,NCNTY7,LKEY7,NSIZE7,
     *       NPRMT7,IT7
          FIRST=.FALSE.
          GO TO 410
C*****    FIPS-NEDS INDEX TABLE FILE IS EMPTY.
406       WRITE (6,9406)
9406      FORMAT (/10X,'HASH TABLE IS NOT IN FILE.'/10X,'TASK ABORTED.'/)
          CALL EXIT
C*****    ERROR IN ATTEMPT TO READ FIPS-NEDS INDEX TABLE.
407       WRITE (6,9407) IOSTAT
9407      FORMAT (/10X,'ERROR ',I5,' IN READING HASH TABLE FILE.'/
     *       10X,'TASK ABORTED.'///)
          CALL EXIT
       END IF
410    ICNTY=IST*10000+ICY
       CALL CHAIN2 (ICNTY,LKEY7,INSERT,NSIZE7,NPRMT7,IT7,IRET,II)
       IF (IRET.NE.0) THEN
          WRITE (6,9430) ICNTY
9430      FORMAT (/10X,'FIPS/NEDS HASHING TABLE ERROR WITH STATE/COUNTY',
     *       I7/10X,'TASK ABORTED.'///)
          CALL EXIT
       END IF
       JCNTY=IT7(3,II)
       JST=INT(JCNTY/10000)
C*****STORE NEDS VALUES IN ARGUMENTS.
       IST=JST
       ICNTY=JCNTY-(JST*10000)
       RETURN
```

```
      END
C
C***********************************************************************
C
      SUBROUTINE CHAIN2 (ICNTY,LKEY7,INSERT,NSIZE7,NPPMT7,IT7,IRET,II)
C
C     THIS DUMMY SUBROUTINE TEMPORARILY STANDS IN FOR THE TRUE ROUTINE
C     WHICH IS AVAILABLE THROUGH LINKEDIT CALL TO NEROS*UTILITY1.
C
C***********************************************************************
C
      LOGICAL        INSERT
      INTEGER        IT7(3,4001)
      IRET-0
      II-1
      IT7(3,II)-ICNTY
      RETURN
      END
```

APPENDIX C

PROGRAM LISTING FOR VIRGINIA

```
C     ACID*VIRGINIA.FOR
C
C     PROGRAM TO COMBINE 31 INDEPENDENT CITIES FROM VA. WITH
C     CORRESPONDING COUNTIES WITH IDENTICAL NEDS CODES.
C
C     CHANGE CODE FOR EACH FILE RUN (TOTPOP.,TOTHSG.)
C
C     ACID*VIRGINIA.RUN      RUNSTREAM
C     ACID*DNSTREAMS.COMLINK  COMPILE AND LINK
C     ACID*VIR-MESS.    MESSAGE FILE
C
C     WRITTEN 2/22/85 BY DON NEAL TO SUPPLEMENT ACID*CREATE5A.FOR
C
C-----DEFINE VARIABLES AND OPEN FILES
C
      COMMON/ALL/STATE,CNTY,CSTATE,CCNTY,OUT,MSG,SCNTY,ECNTY,SCITY,
     1          ECITY,EID1,EID2,SUM,NGRID,COL(160),ROW(160),DAT(160),
     2          CEID1,CEID2,CSUM,CNGRID,CCOL(160),CROW(160),CDAT(160),
     3          YPRCNT(160),CPRCNT(160),K,I
      CHARACTER*6 FILENM
      CHARACTER*16 STATE,CNTY,CSTATE,CCNTY
      INTEGER OUT,MSG,SCNTY,ECNTY,SCITY,ECITY,EID1,EID2,SUM,NGRID,
     1       COL,ROW,DAT,CEID1,CEID2,CSUM,CNGRID,CCOL,CROW,CDAT,K
C
C
      DATA OUT/21/,MSG/7/,SCNTY/2778/,ECNTY/2872/,SCITY/2873/,
     1     ECITY/2913/,ICFP/2873/
C
      FILENM-'TOTPOP'
C
C
      OPEN(MSG,STATUS-'OLD',ACCESS-'SEQ',FORM-'FORMATTED',
     1     FILE-'ACID*VIR-MESS.')
      OPEN(OUT,STATUS-'OLD',ACCESS-'DIR',FORM-'UNFORMATTED',
     1     FILE-FILENM,RECL-613,RCDS-3140)
C
C-----MAIN PROGRAM
C
      DO 100 K-SCNTY,ECNTY
        READ(OUT'K,ERR-500) EID1,EID2,STATE,CNTY,SUM,NGRID,
     1       (COL(L),ROW(L),L-1,NGRID),(DAT(L),L-1,NGRID),
     2       (YPRCNT(L),L-1,NGRID)
C
        CALL LOOKUP
  100 CONTINUE
C
C-----ELIMINATE CITIES THAT WERE COMBINED WITH COUNTIES
C
      DO 600 II-SCITY,ECITY
        READ(OUT'II,ERR-500) CEID1,CEID2,CSTATE,CCNTY,CSUM,CNGRID,
     1       (CCOL(L),CROW(L),L-1,CNGRID),(CDAT(L),L-1,CNGRID),
     2       (CPRCNT(L),L-1,CNGRID)
C
        IF(CEID1.NE.0) THEN
          WRITE(OUT'ICFP) CEID1,CEID2,CSTATE,CCNTY,CSUM,CNGRID,
     1         (CCOL(L),CROW(L),L-1,CNGRID),(CDAT(L),L-1,CNGRID),
     2         (CPRCNT(L),L-1,CNGRID)
          ICFP-ICFP+1
        ENDIF
  600 CONTINUE
      WRITE(MSG,10)
   10 FORMAT(/'**** NORMAL TERMINATION OF PROGRAM ****'/)
      GOTO 50
  500 WRITE(MSG,510) K
  510 FORMAT(/'ERROR IN READ OF RECORD NUMBER ',I4/)
   50 END
```

```
C
C*****************************************************************
      SUBROUTINE LOOKUP
C*****************************************************************
C
C     SCAN CITY RECORDS FOR MATCHING ID
C
      COMMON/ALL/STATE,CNTY,CSTATE,CCNTY,OUT,MSG,SCNTY,ECNTY,SCITY,
     1           ECITY,EID1,EID2,SUM,NGRID,COL(160),ROW(160),DAT(160),
     2           CEID1,CEID2,CSUM,CNGRID,CCOL(160),CROW(160),CDAT(160),
     3           YPRCNT(160),CPRCNT(160),K,I
      CHARACTER*16 STATE,CNTY,CSTATE,CCNTY
      INTEGER OUT,MSG,SCNTY,ECNTY,SCITY,ECITY,EID1,EID2,SUM,NGRID,
     1        COL,ROW,DAT,CEID1,CEID2,CSUM,CNGRID,CCOL,CROW,CDAT,K
      DATA OUT/21/,MSG/7/,SCNTY/2778/,ECNTY/2872/,SCITY/2873/,
     1     ECITY/2913/
C
C-----SEARCH CITIES
C
      DO 100 I=SCITY,ECITY
        READ(OUT'I,ERR=500) CEID1,CEID2,CSTATE,CCNTY,CSUM,CNGRID,
     1      (CCOL(L),CROW(L),L=1,CNGRID),(CDAT(L),L=1,CNGRID),
     2      (CPRCNT(L),L=1,CNGRID)
        IF(CEID1.EQ.EID1) THEN
          CALL MATCH
          WRITE(MSG,110) CCNTY,CNTY
        ENDIF
  100 CONTINUE
      RETURN
  110 FORMAT(A16,' BELONGS TO ',A16,' COUNTY.')
  500 WRITE(MSG,501) I
  501 FORMAT(/'ERROR IN READ OF RECORD NUMBER ',I4/)
      END
C
C*****************************************************************
      SUBROUTINE MATCH
C*****************************************************************
C
C     PROCESS MATCH OF CITY AND COUNTY
C
C     1. ADD CITY TO COUNTY SUM
C     2. SEARCH FOR ROW-COL MATCH
C     3. IF NO ROW-COL MATCH, APPEND TO COUNTY AND INCREMENT NGRID
C     4. IF MATCH, ADD CITY TO COUNTY DATA FOR SPECIFIC ROW-COL
C     5. RECALCULATE GRID CELL PERCENTAGES
C     6. WRITE THE MODIFIED RECORD
C
      COMMON/ALL/STATE,CNTY,CSTATE,CCNTY,OUT,MSG,SCNTY,ECNTY,SCITY,
     1           ECITY,EID1,EID2,SUM,NGRID,COL(160),ROW(160),DAT(160),
     2           CEID1,CEID2,CSUM,CNGRID,CCOL(160),CROW(160),CDAT(160),
     3           YPRCNT(160),CPRCNT(160),K,I
      CHARACTER*16 STATE,CNTY,CSTATE,CCNTY
      INTEGER OUT,MSG,SCNTY,ECNTY,SCITY,ECITY,EID1,EID2,SUM,NGRID,
     1         COL,ROW,DAT,CEID1,CEID2,CSUM,CNGRID,CCOL,CROW,CDAT,K
      DATA OUT/21/,MSG/7/,SCNTY/2778/,ECNTY/2872/,SCITY/2873/,
     1     ECITY/2913/
C
C-----ADD THE SUMS
C
      SUM=CSUM+SUM
C
C-----SEARCH FOR ROW-COL MATCH
C
      DO 100 JJ=1,CNGRID
        DO 50 KK=1,NGRID
          IF(CCOL(JJ).EQ.COL(KK).AND.CROW(JJ).EQ.ROW(KK))THEN
```

```
C
C-----ROW-COL MATCH, ADD TO COUNTY
C
              DAT(KK)=DAT(KK)+CDAT(JJ)
              GOTO 100
C
             ENDIF
    50   CONTINUE
C
C-----NO ROW-COL MATCH, APPEND
C
        NGRID=NGRID+1
        ROW(NGRID)=CROW(JJ)
        COL(NGRID)=CCOL(JJ)
        DAT(NGRID)=CDAT(JJ)
C
  100 CONTINUE
C
C-----RECALCULATE PERCENTAGES FOR COUNTY
C
      DO 150 LL=1,NGRID
        YPRCNT(LL)=FLOAT(DAT(LL))/SUM
  150 CONTINUE
C
C-----WRITE RECORD BACK TO FILE
C
      WRITE(OUT'K,ERR=500) EID1,EID2,STATE,CNTY,SUM,NGRID,
     1     (COL(L),ROW(L),L=1,NGRID),(DAT(L),L=1,NGRID),
     2     (YPRCNT(L),L=1,NGRID)
C
C-----ALTER NEDS OF COMBINED CITY RECORD
C
      CEID1=0
      WRITE(OUT'I,ERR=500) CEID1,CEID2,CSTATE,CCNTY,CSUM,CNGRID,
     1     (CCOL(L),CROW(L),L=1,CNGRID),(CDAT(L),L=1,CNGRID),
     2     (CPRCNT(L),L=1,CNGRID)
C
      RETURN
C
  500 WRITE(MSG,501) K
  501 FORMAT(/'ERROR IN WRITING RECORD ',I4/)
      END
```

APPENDIX D

PROGRAM LISTING FOR NEWLAND

```
C  ACID*PTLAND.FOR/USA          12/19/84            M. LENNON
C GCAGFLND JOB (6304,TAAT,1,10),'GCA/B/1623004',CLASS=F
C *
C *  CREATE LAND USE ALLOCATION FACTORS FROM LAND USE DATA AND
C *  GRID-COUNTY RELATIONSHIP FILE.
C *
C LAND EXEC FTG1CLG
C
C  PROGRAM NAME: LANDT
C ... PROGRAM TO CONVERT LAND USE DATA (LANDSAT) FROM PERCENT OF
C ... GRID WHICH FITS EACH LAND USE CATEGORY INTO TOTAL LAND USE
C ... CATEGORY AREA THAT FALLS WITHIN EACH COUNTY.
C
C.....
C.....MODIFICATION BY D. NEAL, 1/16/85
C.....  TO CALCULATE 'COMPOSITE FOREST' LANDSAT CATEGORY
C.....  FROM EXISTING LANDSAT DATA.
C
C.....
C.....MODIFICATION BY M. LENNON, 11/26/84
C.....  TO READ FILES FOR ENTIRE UNITED STATES
C.....  LANDSAT DATA FILE FROM DON NEAL
C.....  COUNTY/GRID DATA FILE FROM MARK LENNON
C ....  MODIFICATIONS WERE IN MAKING COUNTY TO GRID INPUT FILE A
CX      FORMATTED FILE, STILL UNFORMATTED READ, AND IN ENLARGING
C       MAXGRD TO ALLOW READING IN OF ALL USA COUNTIES
C
C    I/O MODIFICATIONS 12/19/84           M . LENNON
C      NAME CHANGES TO INPUT AND OUTPUT FILES.
C       LANDSAT INPUT FILE:  COPY TO PTLANDU-IN BEFORE RUN
C       GRID INPUT FILE:  COPY TO PTGRID-IN BEFORE RUN
C       OUTPUT FILE:  WILL BE PTLAND-OUT -- SHOULD BE COPIED
C          TO A PERMANENT AND HANDILY NAMED ENTITY.  THIS FILE
C          SHOULD NOT EXIST BEFORE RUN.
C       PRINT REPORT FILE:  WILL BE PTLAND-PRINT -- SHOULD
C          NOT EXIST BEFORE RUN, AND SHOULD BE COPIED TO
C          ANOTHER FILE (IF ONE IS DESIROUS OF KEEPING THIS
C          IN THE FIRST PLACE) AFTER RUN.
C
C
       DIMENSION CTOTAL(11)
        INTEGER CTYID,OTCNTY
        COMMON/AREA/IGRID, NOCAT, ICNTY(10), IPCT(10), CAREA(4000,12), IX
       COMMON /CTY/ NCNTY(4000),MAXCTY,MCTCNT,NSORT(4000),CTYID(4000)
       COMMON /MAX/ MAXLP, MAXGRD
       COMMON/DEVICE/ILANDU,IREAD,KGRID,IPRINT
       DATA CTOTAL/11*0.0/
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C    FILE DEFINITIONS
C
C ... OUTPUT FILE LANDU
       ILANDU = 15
C
C ... EPA LAND USE/COVER DATA
       IREAD = 10
C
C ... EPA COUNTY-GRID AREA RELATIONSHIPS
       KGRID = 9
C
C ... PRINTER REPORT
       IPRINT = 31
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C    OPEN THE FILES (#### ADJUST TO MEET UNIVAC STANDARDS ###)
```

```
C   ##########################################################
C   ##########################################################
C   ##########################################################
C
C ... OUTPUT FILE LANDU
      OPEN (ILANDU,STATUS-'NEW',ACCESS-'SEQ',FORM - 'FORMATTED',
     *FILE-'ACID*PTLAND-OUT.')
C
C ... EPA LAND USE/COVER DATA
      OPEN (IREAD,STATUS-'OLD',ACCESS-'SEQ',FORM - 'UNFORMATTED',
     *FILE-'ACID*PTLANDU-IN.')
C
C ... EPA COUNTY-GRID AREA RELATIONSHIPS
      OPEN (KGRID,STATUS-'OLD',ACCESS-'SEQ',FORM - 'FORMATTED',
     *FILE-'ACID*PTGRID-IN.')
C
C ... PRINTOUT FILE
      OPEN (IPRINT,STATUS-'NEW',ACCESS-'SEQ',FORM-'FORMATTED',
     *FILE-'ACID*PTLAND-PRINT.')
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C      DEFINE FILE KGRID(47268,47,E,IX)
C
      MCTCNT - 0
      MAXCTY - 4000
      MAXLP - 55
      MAXGRD - 33408
C     MAXGRD - 6960
C     USE 100 RECORDS FOR TEST
C     MAXGRD - 100
C
       DO 10 I - 1,MAXCTY
       DO 10 J - 1,12
       CAREA (I, J) - 0.0
10     CONTINUE
C
C ... READ LAND USE TOTALS BY GRID, GET COUNTY SUMS
C ---- NOTE THAT INPUT OF GRID CELL INFO. IS BASED ON RELATIVE
C ---- GRID NO., STARTING FROM NW CORNER AND PROCEEDING TO SE
C ----- CORNER.
       CALL CONVRT
       INDXC - 1
       LINE - 0
C
C ---- COUNTY SORT, SORTED INDEXES WILL BE PUT INTO 'NSORT' ARRAY.
      CALL CSORT
C
C ..... LOOP ON COUNTIES IN STUDY AREA
       DO 30 OTCNTY - 1,MCTCNT
        LCNTY - NSORT(OTCNTY)
C ..... ACCUMULATE TOTALS FOR STUDY AREA.
        DO 15 I-1,12
         CTOTAL(I) - CTOTAL(I) + CAREA(OTCNTY,I)
 15     CONTINUE
        IF (LINE. GT. 0) GO TO 20
         LINE - MAXLP
         WRITE (IPRINT,121)
 121     FORMAT(1H1,/T79,'WET-',
     1      T86,'MIXED',/T3,'COUNTY',T15,'URBAN',T23,'AGRIC',
     2      T31,'RANGE',T39,'DECID',T47,'CONIF',T55,'MIXED',
     3      T63,'WATER',T70,'OUTSIDE',T79,'LAND',T85,'AG,RANGE',
     4      T95,'COMPOS',T105,'TOTAL')
 20   WRITE (IPRINT,120)  CTYID(LCNTY),(CAREA(LCNTY,J),J-1,12)
      LINE - LINE -1
120   FORMAT(1X, I6, 4X, 12(F8.0))
```

```
30     CONTINUE
C
      WRITE (IPRINT,122) CTOTAL
 122  FORMAT(11X,12F8.0)
C
C  --- DETERMINE LAND USE FACTORS BY RE-READING LAND USE DATA.
 60    CALL FACTOR
70     STOP
       END
C
C
       SUBROUTINE CONVRT
C ... CONVERTS PERCENT OF EACH GRID WHICH FITS EACH CATEGORY
C ... INTO THE AREA (SQ. KM) OF EACH CATEGORY WITHIN EACH GRID.
C ... USES LANDSAT DATA.
C
       INTEGER CTYID,GRIDNO
       REAL LAT,LON,PERCNT
       DIMENSION PERCNT(11), AREA(11)
       COMMON/AREA/IGRID, NOCAT, ICNTY(10), IPCT(10), CAREA(4000,12), IX
      COMMON /CTY/ NCNTY(4000),MAXCTY,MCTCNT,NSORT(4000),CTYID(4000)
       COMMON /MAX/ MAXLP,MAXGRD
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C    FILE DEFINITIONS
C
        COMMON/DEVICE/ILANDU,IREAD,KGRID,IPRINT
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C   ...... GRID LOOP ..........
       DO 80 IGRID - 1, MAXGRD
C
C ##########             FIX TO READ BINARY            ############
C
       READ (IREAD, END - 20) LAT, LON, (PERCNT(J), J-1,10)
110    FORMAT (F4.0, 12X, 10I6)
C     PRINT 8888, LAT,(PERCNT(J),J-1,10)
C8888 FORMAT (2F6.2,10(1X,F7.3))
       CALL GRIDA (LAT, AREAGD)
C      WRITE(IPRINT, 111) IGRID, LAT, AREAGD
C11    FORMAT(1X,'FOR GRID',I5,2X,'LAT',F5.0,2X,'GRID AREA(SQ. KM)-',
C    +F7.1)
C
C     CALCULATE COMPOSITE FOREST
      PERCNT(11)-PERCNT(4)+PERCNT(5)+PERCNT(6)
C
20     CONTINUE
C
C ##########             FIX TO READ BINARY            ############
C XXX LENNON FIX 11/26/84 TO READ FORMATTED XXX
C
      DO 666 III-1,10
         IPCT(III)-0
         ICNTY(III)-0
  666 CONTINUE
C     IF (IGRID.GT.6945) THEN
C        PRINT *, IGRID,MAXGRD
C     END IF
        READ (KGRID, 150, ERR-1001) GRIDNO,MCNTY,
     &  (ICNTY(I),IPCT(I),I-1,MCNTY)
  150 FORMAT (1X,I5,1X,I2,10(1X,I6,1X,I3))
      IF (MOD(IGRID,1000).EQ.0) THEN
            PRINT *, IGRID,' LINES READ'
         END IF
```

```
C       IF (MOD(IGRID,100).EQ.0.OR.IGRID.GT.6945) THEN
C          PRINT *, IGRID,MAXGRD,GRIDNO,MCNTY,ICNTY(1),IPCT(1)
C       END IF
C        WRITE (IPRINT,221) IGRID, MCNTY, (ICNTY(I), IPCT(I), I-1,MCNTY)
C21      FORMAT (1X,'FOR GRID',I5, 2X,'NO.CNTIES:',I2, 5(2X,'CNTY ID:' I6,
C     +1X, 'CNTY PERCENT:', I3))
         DO 30 L - 1, 11
C        AREA(L) - (FLOAT(PERCNT(L)) * AREAGD) / 100.0
C  M.L. 12/7/84
         AREA(L) - (PERCNT(L) * AREAGD) / 100.0
C       IF (MOD(IGRID,50).EQ.0) PRINT *,
C     &    ' PCT-',PERCNT(L),' GRD AREA-',AREAGD,' AREA-',AREA(L)
30       CONTINUE
         IF (MCNTY.EQ.0) GOTO 80
C     ..... LOOP ON COUNTIES/GRID .....
        DO 40 K - 1, MCNTY
C  ***** LOOK UP COUNTY INDEX.
       CALL LOOKUP(ICNTY(K),INDEX,0)
       DO 40 M-1,11
         AMT - ((FLOAT(IPCT(K))*AREA(M))/100.)
C         IF (MOD(IGRID,50).EQ.0) PRINT *,
C     &    ' PCT-',IPCT(K),' AREA-',AREA(M),' AMT-',AMT
C      ***** SAVE COUNTY I.D. AND 10 LAND USE AREAS IN
C      ***** COUNTY TOTAL ARRAY.
         CTYID(INDEX) - ICNTY(K)
         CAREA(INDEX,M) - CAREA(INDEX,M) + AMT
C
C      DO NOT INCLUDE COMPOSITE FOREST IN TOTAL CTY AREA
       IF (M.EQ.11) GOTO 40
C
         CAREA(INDEX,12) - CAREA(INDEX,12) + AMT
40      CONTINUE
80      CONTINUE
       PRINT *, IGRID-1,' LINES READ.  OUT OF READ/CALC LOOP IN CONVRT'
       PRINT *, '  '
       PRINT *, ' FINAL GRID CELL -',GRIDNO
       PRINT *, '  '
       GO TO 1002
 1001  PRINT *, IGRID,' READ SUCCESSFULLY, THEN A BOMB'
       STOP 1003
C
 1002   RETURN
        END
C
C
        SUBROUTINE GRIDA (LAT, AREAGD)
C ... COMPUTES THE AREA (SQ. KM) OF THE GRID ACCORDING TO THE
C ... LATITUDE AND LONGITUDE COORDINATES.
C      LAT - LATITUDE (DEG.) OF GRID CELL
C      X - LAT IN RADIANS
        COMMON/MAX/ MAXLP,MAXGRD
        REAL LAT, X, AREAGD
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C     FILE DEFINITIONS
C
         COMMON/DEVICE/ILANDU,IREAD,KGRID,IPRINT
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C
       X - LAT * (3.1415 / 180)
       AREAGD - 20 * (22.22 * COS(X))
C
60     RETURN
       END
```

```
C
C
C
C
       SUBROUTINE LOOKUP (JCNTY,INDEX,IFLAG)
C ... SEARCHES THROUGH THE TABLE,FINDS THE RELATIVE INDEX
C ... OF THE COUNTY I.D.
C ... JCNTY - COUNTY NO
C ... IFLAG: 0-SEARCH FOR MATCH, ADD IF NO MATCH.
C             1-SEARCH ONLY FOR MATCH.
       COMMON/MAX/ MAXLP,MAXGRD
      COMMON /CTY/ NCNTY(4000),MAXCTY,MCTCNT,NSORT(4000),CTYID(4000)
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C    FILE DEFINITIONS
C
        COMMON/DEVICE/ILANDU,IREAD,KGRID,IPRINT
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C
      INDEX - 0
      IF (IFLAG .EQ. 1) GO TO 50
      IF (MCTCNT .GT. 0) GO TO 50
C ---- FIRST COUNTY ----
        MCTCNT - 1
        NCNTY(1) - JCNTY
        INDEX - 1
        GO TO 500
C
C ---- CHECK IF COUNTY EXISTS IN LIST.
 50   DO 100 I-1,MCTCNT
       IF (NCNTY(I) .NE. JCNTY) GO TO 100
C   ***** MATCH *****
         INDEX - I
         GO TO 500
 100  CONTINUE
      IF (IFLAG .EQ. 1) GO TO 500
C
C ---- ADD NEW COUNTY.
      MCTCNT - MCTCNT + 1
      IF (MCTCNT .LE. MAXCTY) GO TO 120
C **** OVERFLOW ****
        WRITE (IPRINT,110) MAXCTY,JCNTY
 110    FORMAT(1X,'*** OVERFLOW COUNTY TABLE, MAX-',I6,
     1      ' CURRENT ONE-',I6)
        STOP 33
C
 120  NCNTY(MCTCNT) - JCNTY
      INDEX - MCTCNT
 500  CONTINUE
      RETURN
      END
C
C
       SUBROUTINE FACTOR
C ... CCAPG - COUNTY CATEG. AREA PER GRID
C ... CTLU - COUNTY TOTAL LAND USE
C
       INTEGER CTYID,GRIDNO,
     +  CNTYCD, CTLU, STATEN, Z,  FIPS
       REAL LAT, LONG,PERCNT
       DIMENSION PERCNT(11),  AREA(11), CTLU(11),
     + CCAPG(11), APFTR(11)
C
       COMMON/AREA/IGRID, NOCAT, ICNTY(10), IPCT(10), CAREA(4000,12), IX
      COMMON /CTY/ NCNTY(4000),MAXCTY,MCTCNT,NSORT(4000),CTYID(4000)
      COMMON /MAX/ MAXLP,MAXGRD
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C    FILE DEFINITIONS
C
         COMMON/DEVICE/ILANDU,IREAD,KGRID,IPRINT
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C ---- RE-WIND LAND USE FILE.
C XX REWIND KGRID INSERTED BY LENNON 12/3/84
        REWIND (IREAD)
       REWIND (KGRID)
       LINE = 0
       JOUT = 0
C
C    ***** GRID LOOP *****
       PRINT *, ' ENTERING READ/CALCULATE/WRITE LOOP IN FACTOR'
        DO 350 NGRID = 1, MAXGRD
C
C ##########             FIX TO READ BINARY            ############
C
        READ (IREAD, END =700) LAT, LONG, (PERCNT(J), J=1,10)
500     FORMAT (F4.0, 4X, F4.0, 4X, 10I6)
C
C    CALCULATE COMPOSITE FOREST
       PERCNT(11)=PERCNT(4)+PERCNT(5)+PERCNT(6)
C
        CALL GRIDA (LAT, AREAGD)
C
C ##########             FIX TO READ BINARY            ############
C
C XX READ AND FORMAT MODIFIED BY M LENNON 12/3/84 XX
C     IF (MOD(NGRID,100).EQ.0)PRINT *, ' HERE WE ARE'
        READ (KGRID,511) GRIDNO,MCNTY,(ICNTY(I),IPCT(I), I=1,MCNTY)
510     FORMAT(I2, 5(I6, I3))
  511 FORMAT (1X,I5,1X,I2,10(1X,I6,1X,I3))
         IF (MOD(NGRID,1000).EQ.0) THEN
           PRINT *, NGRID,' LINES READ IN FACTOR. GRIDNO=',GRIDNO
         END IF
C ----- COMPUTE LAND USE AREAS OF GRID ----
        IF (MCNTY.EQ.0) GOTO 350
        DO 310 L = 1, 11
C       AREA(L) =  (FLOAT(PERCNT(L)) * AREAGD) / 100.0
C M.L. 12/7/84
        AREA(L) = (PERCNT(L) * AREAGD) / 100.0
310     CONTINUE
C   ***** COUNTIES/GRID LOOP *****
        DO 330 K = 1, MCNTY
          IF (LINE .GT. 0) GO TO 200
           LINE = MAXLP
           WRITE (IPRINT,150)
 150       FORMAT(1H1/41X,'- - - - - - - A L L O C A T I O N  ',
     1       'F A C T O R S - - - - - - -'/T7,'PCT. IN',T101,'MIXED',
     *     T110,'AREA',
     2       /1X,'GRID',T8,'COUNTY',T16,'COUNTY',T25,'LAT',
     *    T32,'LONG',T38,'URBAN',
     3       T45,'AGRIC',T52,'RANGE',T59,'DECID',T66,'CONIF',T73,
     4      'MIXED',T80,'WATER',T86,'OUTSIDE',T95,'WET',T100,'AG,RANGE',
     5      T109,'RATIO')
C
 200       JCNTY = ICNTY(K)
          CALL LOOKUP(JCNTY,INDEX,1)
C  ---- PORTION OF GRID IN COUNTY.
           PCT = FLOAT(IPCT(K)) / 100.
```

```
C        IF (MOD(NGRID,50).EQ.0) PRINT *, GRIDNO,MCNTY,' PCT= ',PCT,
C    &       ' IPCT=',IPCT(K)
C
C  ---- LOOP ON L/U CATEGORIES , COMPUTE RATIO OF GRID/COUNTY
C  ---- LAND USE AREA FOR EACH CATEGORY.
        DO 320 M = 1, 11
        CCAPG(M) = PCT * AREA(M)
        CTYAR = CAREA(INDEX,M)
        IF (CTYAR.EQ.0) GOTO 315
        APFTR(M) = CCAPG(M) / CTYAR
C  ***** DEBUG *****
        IF (APFTR(M) .GT. 1.0) WRITE (IPRINT,600) JCNTY,NGRID,M,
     1     CCAPG(M),CTYAR
 600    FORMAT(1X,'!!GRID LAND USE EXCEEDS COUNTY FOR COUNTY,GRID',
     1   ',GRID AREA,COUNTY AREA:'/1X,I6,1X,I6,I3,2F10.3)
        GOTO 320
315     APFTR(M) = 0
320     CONTINUE
C
C ... COMPUTE RATIO OF GRID AREA(IN COUNTY) TO COUNTY AREA.
       ARAT = PCT * AREAGD / CAREA(INDEX,12)
C      IF (MOD(NGRID,50).EQ.0) PRINT *, ' CTY AREA=',CAREA(INDEX,12),
C    &       ' PCT=',PCT,' GRD AREA=',AREAGD,' ARAT=',ARAT
       WRITE (ILANDU,530) GRIDNO,PCT,JCNTY,LAT,LONG,AREAGD,
     1   (APFTR(N),N=1,11),ARAT
 530  FORMAT(I5,F8.5,I6,2F6.2,F6.2,12F5.3)
C
      WRITE (IPRINT,531) NGRID,IPCT(K),JCNTY,LAT,LONG,(APFTR(N),N=1,10),ARAT
 531  FORMAT(1X,I4,4X,I4,3X,I6,2(2X,F5.2),11(2X,F5.3))
      LINE = LINE - 1
      JOUT = JOUT + 1
C
 330  CONTINUE
 350  CONTINUE
C
 700  WRITE (IPRINT,501) JOUT
 501  FORMAT(1H1,I5,' GRID-COUNTY ALLOCATION RECORDS WRITTEN')
      PRINT *, ' '
      PRINT *, 'OUT OF FINAL WRITE LOOP. GRIDNO=',GRIDNO
      PRINT *, ' '
      PRINT *, '    OUTPUT FILE IS PTLAND-OUT'
      PRINT *, '    REPORT PRINT FILE IS PTLAND-PRINT'
C
      RETURN
      END
      SUBROUTINE CSORT
C
C .... SORT THE NEDS COUNTY I.D.S IN ASCENDING ORDER, PLACING
C .... RELATIVE INDEX NOS. IN ARRAY 'NSORT'.
C
      DIMENSION IDCTY(4000)
      INTEGER CTYID
       COMMON/AREA/IGRID, NOCAT, ICNTY(10), IPCT(10), CAREA(4000,12), IX
      COMMON /CTY/ NCNTY(4000),MAXCTY,MCTCNT,NSORT(4000),CTYID(4000)
       COMMON/MAX/MAXLP,MAXGRD
      LOGICAL*4 SWAP
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C     FILE DEFINITIONS
C
        COMMON/DEVICE/ILANDU,IREAD,KGRID,IPRINT
C
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C .... INITIALIZE INDEX ARRAY AND COUNTY I.D.S
      DO 10 I=1,MCTCNT
```

```
          NSORT(I) - I
          IDCTY(I) - CTYID(I)
 10     CONTINUE
C
        SWAP - .TRUE.
        KK - MCTCNT-1
        DO 100 I-1,KK
         IF (.NOT. SWAP) GO TO 150
         SWAP - .FALSE.
         LL - MCTCNT - I
         DO 50 J-1,LL
          IF (IDCTY(J) .LT. IDCTY(J+1)) GO TO 50
C    ------ ITS SWAP TIME.
           SWAP - .TRUE.
           IHOLD - IDCTY(J)
           IDCTY(J) - IDCTY(J+1)
           IDCTY(J+1) - IHOLD
C    ------ NOW SWAP THE INDEXES.
           IHOLD - NSORT(J)
           NSORT(J) - NSORT(J+1)
           NSORT(J+1) - IHOLD
 50      CONTINUE
 100    CONTINUE
 150    RETURN
        END
C GO.FT09F001  DD  DSN-GCA.FTMPSSP.GRIDDA,DISP-SHR,DCB-DSORG-DA
C GO.FT10F001  DD  DSN-GCA.FTNECRMP.NEROS,DISP-SHR
C GO.FT15F001  DD  DSN-GCA.FTMPSSP.LANDU,DISP-SHR
```

APPENDIX E

PROGRAM LISTING FOR SPACE-MERGE

```
C     ACID*SPACE-MERGE.FOR
C
C     RMDHS SUPPORT PROGRAM DESIGNED TO MODIFY LANDSAT SPATIAL
C     ALLOCATION FACTORS, CENSUS TOTPOP AND TOT HSG FILES FOR
C     INPUT INTO ASGRID PROGRAM.
C
C     INPUT FILES: ACID*PTLAND-OUT.       LANDSAT ALLOCATIONS(SEQ)
C                  ACID*TOTHSG.           CENSUS HOUSING ALLOC.(DIR)
C                  ACID*TOTPOP.           CENSUS POPULATION ALLOC.(DIR)
C
C     OUTPUT FILES: ACID*SPACE-OUT.       MERGED FILE FOR ASGRID INPUT
C                   ACID*SPACE-MESS.      MESSAGE FILE
C
C     OTHER FILES: ACID*DNSTREAMS.COMLINK  COMPILE AND LINK
C                  ACID*SPACE-MERGE.RUN     RUNSTREAM TO EXECUTE
C
C     BY DON NEAL  2/21/85
C
C     REVISED 3/7/85 TO INCLUDE AQCR SUBROUTINE
C
C-----DECLARE VARIABLES AND ASSIGN VALUES
C
      CHARACTER*16 STATE,CTY
C
C     COMMON AREAS
C
      COMMON/FILES/ILAND,IHSG,IPOP,ISPACE,IMSG
      COMMON/LANDU/IGRDNO,PCT,JCNTY,CLAT,CLONG,AREAGD,APFTR(11),ARAT,
     1             LROW,LCOL
      COMMON/CENSUS/IEID1,IEID2,STATE,CTY,ISUM,NGRID,
     1              ICOL(160),IROW(160),IDAT(160),CPRCNT(160)
      COMMON/COUNT/NUMREC,LIMIT,ISREC,IEREC,SPAL(14)
C
      NUMREC-0
C
C     FILE CHANNELS
C
      ILAND-21
      IHSG-22
      IPOP-23
      ISPACE-11
      IMSG-12
C
C     OPEN FILES
C
      OPEN(ILAND,STATUS-'OLD',ACCESS-'SEQ',FORM-'FORMATTED',
     1FILE-'ACID*PTLAND-OUT.')
      OPEN(IHSG,STATUS-'OLD',ACCESS-'DIR',FORM-'UNFORMATTED',
     1FILE-'ACID*TOTHSG.',RECL-613,RCDS-3140)
      OPEN(IPOP,STATUS-'OLD',ACCESS-'DIR',FORM-'UNFORMATTED',
     1FILE-'ACID*TOTPOP.',RECL-613,RCDS-3140)
      OPEN(ISPACE,STATUS-'OLD',ACCESS-'SEQ',FORM-'FORMATTED',
     1FILE-'ACID*SPACE-OUT.')
      OPEN(IMSG,STATUS-'OLD',ACCESS-'SEQ',FORM-'FORMATTED',
     1FILE-'ACID*SPACE-MESS.')
C
C-----WRITE HEADER TO OUTPUT FILE
C
      WRITE(IMSG,210)
  210 FORMAT(4X,'****** MISSING CENSUS RECORDS ******'/19X,
     1   'LANDSAT',5X,'AREA OF'/5X,'NEDSID',5X,'ROW',5X,'COL',5X,'PROG'
     2      /5X,'------------------------------')
C
C
C-----MAIN ROUTINE
C
```

```
    5 CALL LANDRD
      CALL NDFIND
      CALL SEARCH
      NUMREC-NUMREC+1
C
      GOTO 5
       END
C
C*****************************************************************
      SUBROUTINE LANDRD
C*****************************************************************
C
C-----READS A RECORD FROM LANDSAT AND CALCULATES ROW AND COL.
C
      COMMON/FILES/ILAND,IHSG,IPOP,ISPACE,IMSG
      COMMON/LANDU/NGRDNO,PCT,JCNTY,CLAT,CLONG,AREAGD,APFTR(11),ARAT,
     1        LROW,LCOL
C
C
      READ(ILAND,100,END-999,ERR-666) IGRDNO,PCT,JCNTY,CLAT,CLONG,
     1     AREAGD,(APFTR(N),N-1,11),ARAT
      NUMREC-NUMREC+1
C
C-----COMPUTE ROW AND COL
C
      TROW-IGRDNO/240.
      LROW-(INT(TROW)+1)
      LCOL-MOD(IGRDNO,240)
C
      RETURN
  100 FORMAT(I5,F8.5,I6,3F6.2,12F5.3)
  666 WRITE(IMSG,667) NUMREC+1
  667 FORMAT(/'ERROR IN READ OF RECORD NUMBER ',I5)
      GOTO 123
  999 WRITE(IMSG,998) NUMREC
  998 FORMAT(/'END OF LANDSAT DATA AT RECORD NUMBER ',I5)
  123 STOP
      END
C*****************************************************************
      SUBROUTINE NDFIND
C*****************************************************************
C
C-----SET START(ISREC) AND END(IEREC) OF SEARCH
C
      DIMENSION NEDID(53)
      COMMON/LANDU/IGRDNO,PCT,JCNTY,CLAT,CLONG,AREAGD,APFTR(11),ARAT,
     1       LROW,LCOL
      COMMON/COUNT/NUMREC,LIMIT,ISREC,IEREC,SPAL(14)
C
      DATA (NEDID(I),I-1,53)/2,69,69,83,158,216,279,287,290,291,358,
     1     517,517,561,663,755,854,959,1079,1143,1159,1183,1189,1272,
     2     1359,1441,1556,1613,1706,1723,1733,1754,1786,1848,1948,
     3     2001,2089,2166,2202,2269,2269,2274,2320,2386,2481,2735,
     4     2764,2778,2883,2923,2978,3049,3072/
C
C
      INDX-INT(JCNTY/10000)
      IF (INDX.EQ.22) CALL AQCR(LROW,LCOL,JCNTY)
      ISREC-NEDID(INDX)
      IEREC-NEDID(INDX+1)-1
C
      RETURN
      END
C*****************************************************************
      SUBROUTINE SEARCH
C*****************************************************************
```

```
C
C     BEGINNING AT SREC, SEARCH HSG FILE FOR NED-ID,ROW AND COL
C     OUTPUT TO SPATIAL FILE IF FOUND, MESSAGE FILE IF NOT
C
      COMMON/CENSUS/IEID1,IEID2,STATE,CTY,ISUM,NGRID,
     1       ICOL(160),IROW(160),IDAT(160),CPRCNT(160)
      COMMON/FILES/ILAND,IHSG,IPOP,ISPACE,IMSG
      COMMON/COUNT/NUMREC,LIMIT,ISREC,IEREC,SPAL(14)
      COMMON/LANDU/IGRDNO,PCT,JCNTY,CLAT,CLONG,AREAGD,APFTR(11),ARAT,
     1       LROW,LCOL
C
      DIMENSION ISPAL(14)
      CHARACTER*16 STATE,CTY
C
   20 READ(IHSG'ISREC,ERR=999) IEID1,IEID2,STATE,CTY,ISUM,NGRID,
     1    (ICOL(L),IROW(L),L=1,NGRID),(IDAT(L),L=1,NGRID),
     2    (CPRCNT(L),L=1,NGRID)
C
C-----CHECK FOR NEDS MATCH AND END OF RANGE
C
      IF (IEID1.EQ.JCNTY) GOTO 100
      IF (ISREC.EQ.IEREC) GOTO 200
      ISREC=ISREC+1
      GOTO 20
C
C-----CHECK ROW AND COL FOR MATCH
C
  100 DO 50 K=1,NGRID
        IF (ICOL(K).EQ.LCOL.AND.IROW(K).EQ.LROW) THEN
          MATCH=1
          GOTO 300
        ENDIF
   50 CONTINUE
C
C-----NO ROW-COL MATCH
C
      WRITE(IMSG,75) JCNTY,LROW,LCOL
      MATCH=0
      GOTO 300
   75 FORMAT(5X,I6,5X,2(I3,5X),'ROWCOL')
C
C-----NO NEDS MATCH
C
  200 WRITE(IMSG,85) JCNTY,LROW,LCOL
   85 FORMAT(5X,I6,5X,2(I3,5X),'NEDSID')
      MATCH=0
C
C-----WRITE TO RMDHS FILE
C
  300 DO 310 KK=3,13
        SPAL(KK)=APFTR(KK-2)
  310 CONTINUE
      SPAL(14)=ARAT
      SPAL(2)=CPRCNT(K)
C
      READ(IPOP'ISREC,ERR=998) IEID1,IEID2,STATE,CTY,ISUM,NGRID,
     1    (ICOL(L),IROW(L),L=1,NGRID),(IDAT(L),L=1,NGRID),
     2    (CPRCNT(L),L=1,NGRID)
      SPAL(1)=CPRCNT(K)
C
C-----CONVERT PERCENTS
C
      DO 320 JJ=1,14
        IF (SPAL(JJ).GE.1.0) SPAL(JJ)=0.9999
        ISPAL(JJ)=SPAL(JJ)*10000.
  320 CONTINUE
```

```
C
C-----SET POP AND HSG TO 0 IF NO MATCH WAS FOUND
C
      IF (MATCH.EQ.0) THEN
        ISPAL(1)=0
        ISPAL(2)=0
      ENDIF
C
C
C-----WRITE TO FILE
C
      WRITE(ISPACE,330,ERR=950) JCNTY,LCOL,LROW,(ISPAL(L),L=1,14)
C
  330 FORMAT(I6,16I4,8X,'15')
      RETURN
C
C-----ERRORS ETC.
C
C
  950 WRITE(IMSG,951)
  951 FORMAT('WRITE ERROR TO SPATIAL FILE')
      GOTO 1000
C
  998 WRITE(IMSG,9998) ISREC
 9998 FORMAT('READ ERROR IN POP. FILE AT RECORD',I4)
      GOTO 1000
C
  999 WRITE(IMSG,9999) ISREC
 9999 FORMAT('READ ERROR IN HSG. FILE AT RECORD ',I4)
      GOTO 1000
C
 1000 WRITE(IMSG,1001) NUMREC
 1001 FORMAT('RECORD NUMBER ',I5,' NOT WRITTEN')
      RETURN
C
      END
C
C*****************************************************************
      SUBROUTINE AQCR(LROW,LCOL,JCNTY)
C*****************************************************************
C
C     CONVERT MASSACHUSETTS COUNTY IDS INTO AQCR IDS.
C
      DIMENSION ID(110),JROW(110),JCOL(110),JPOP(110)
C
C-----CHECK IF AQCR TABLE HAS BEEN READ. IF NOT FILL ARRAYS.
C
      IF (IFLAG.EQ.1) GOTO 500
C
      OPEN(24,STATUS='OLD',ACCESS='SEQ',FORM='FORMATTED',
     1     FILE='ACID*MAAQCR.')
C
      IFLAG=1
      JK=1
C
   10 READ(24,100,END=500) ID(JK),JCOL(JK),JROW(JK),JPOP(JK)
      JK=JK+1
      GOTO 10
C
  100 FORMAT(I6,2I3,I7)
C
C-----CHECK FOR ROW-COL MATCH BETWEEN NEDSID AND AQCR.  IF
C       MORE THAN 1 MATCH, USE AQCR WITH HIGHEST POPULATION
C       IN THAT GRID CELL.
C
  500 IAQCR=0
```

```
      DO 550 IJ=1,109
        IF (LROW.EQ.JROW(IJ).AND.LCOL.EQ.JCOL(IJ)) THEN
          IF (IAQCR.EQ.0) IAQCR=IJ
          IF (JPOP(IJ).GT.JPOP(IAQCR)) IAQCR=IJ
        ENDIF
  550 CONTINUE
C
C-----CHANGE LANDSAT NEDS ID TO AQCR ID
C
      JCNTY=ID(IAQCR)
      IF (JCNTY.EQ.0) WRITE(*,111) LROW,LCOL
  111 FORMAT(1X,'ROW ',I3,' COL ',I3,' HAS NO AQCR MATCH')
C
      RETURN
      END
```

APPENDIX F

PROGRAM LISTING FOR SAFP

```
IKJ52827I  SAFP.FORT
C
C     APPLICATION: FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)
C
C     PROGRAM: SPATIAL ALLOCATION FACTOR PREPROCESSOR (SAFP)
C
C     LANGUAGE: FORTRAN IV
C
C     PURPOSE: TO QA THE SPATIAL ALLOCATION FACTORS AND OUTPUT ONE
C              SAF RECORD FOR EACH AREA SOURCE CATEGORY AND EACH
C              COUNTY. PROPER SAF'S FOR EACH AS CATEGORY ARE CHOSEN
C              VIA THE SURROGATE SELECTION FILE.
C
C     VARIABLE LIST:
C
C     NAME      FORMAT    ROUTINE       DESCRIPTION
C     -----------------------------------------------------------------------
C     SAFNUM     I2       INCOF         # OF SURROGATES IN SAFF
C     LSTCTY     I6       INCOF         NEDS ID OF LAST COUNTY IN SAFF
C     DEFSUR     I2       INCOF         DEFAULT SURROGATE # IF SAFSUM.GT.0
C     SSF(X,1)   I5       INSSF         AS CATEGORY # (X-1 TO SSFCNT)
C     SSF(X,2)   I2       INSSF         SURROGATE SELECTION FOR SSF (X,1)
C     SSFCNT     I3       INSSF         # OF CATEGORIES READ
C     NEDSID     I6       INSAF         COUNTY NEDS ID
C     COL(NGRID)I4        INSAF         GRID COLUMN
C     ROW(NGRID)I4        INSAF         GRID ROW
C     SAF(I,J)   I4       INSAF         SPATIAL ALLOCATION FACTORS
C     NGRID      I3       INSAF         # OF GRIDS IN COUNTY
C     NOWCTY     I6       INSAF         ID OF CURRENT COUNTY
C     SAFCNT     I7       INSAF         # OF SAF RECORDS READ
C     SAFSUM     I5       QASAF         SUM OF SAF
C     OUTCNT     I7       QASAF         # OF RECORDS OUTPUT
C     I          I3       QASAF         INDEX FOR GRID #(NGRID)
C     J          I3       QASAF         INDEX FOR SAF RECORD(SAFNUM)
C     OLDSUM     I5       NORMAL        SUM OF DATA BEFORE NORMALIZATION
C     DIF        I5       NORMAL        # TO ADD/SUBTRACT FROM SAF'S
C     NRMCNT     I7       NORMAL        # OF NORMALIZATIONS
C     ICBCNT     I4       NORMAL        # OF COMBINATIONS
C     IOVER      I5       NORMAL        TOTAL OF NEGATIVE SAF'S
C     SUBCNT     I7       SUBPOP        # OF SUBSTITUTIONS
C     CTYCNT     I5       MAIN          # OF COUNTIES PROCESSED
C     NUMCOF     I2       MAIN          FILE REFERENCE # (FRN) FOR COF
C     NUMSSF     I2       MAIN          FRN FOR SURROGATE SELECTIONS FILE
C     NUMSAF     I2       MAIN          FRN FOR SPATIAL ALLOCATION FILE
C     NUMOUT     I2       MAIN          FRN FOR OUTPUT FILE
C     NUMREP     I2       MAIN          FRN FOR REPORT OUTPUT(PRINTER)
C     LINCNT     I2       REPORT        LINE COUNTER FOR REPORT
C     -----------------------------------------------------------------------
C
C     ERROR HANDLING: ERROR WILL HALT PROGRAM EXECUTION.
C
C     CALLED BY:  USER SUPPLIED RUNSTREAM (JCL)
C
C     COMPILED BY:  USER SUPPLIED JCL, CLIST, OR INTERACTIVE
C
C     METHOD: SAFP READS THE CONTROL FILE, THE SURROGATE SELECTION
C             FILE AND THE SPATIAL ALLOCATION FACTORS(SAF) FOR ONE
C             COUNTY. THE SAF'S ARE THEN TOTALED. FOR SAF TOTALS
C             WHICH EQUAL 0, A DEFAULT SURROGATE IS USED TO DEFINE
C             NEW SAF'S. IF THE SAF TOTAL IS LT.9995 OR GT.10005 THEN
C             THE SAF'S ARE NORMALIZED. LASTLY, THE REFORMATTED
C             SAF'S ARE OUTPUT FOR EACH AS CATEGORY.
C
C     PROGRAMMER: DON NEAL, GCA/TECHNOLOGY DIVISION, JUNE, 1985
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```
C
C     *****************
C     * PROGRAM SAFP *
C     *****************
C
C-----SPECIFICATION STATEMENTS
C
      COMMON SAFNUM,DEFSUR,LSTCTY,SSF(200,2),SSFCNT,NEDSID,COL(160),
     1      ROW(160),SAF(160,30),NGRID,NOWCTY,SAFCNT,SAFSUM,OUTCNT,
     2      I,J,OLDSUM,DIF,NRMCNT,SUBCNT,CTYCNT,NUMCOF,NUMSSF,NUMSAF,
     3      NUMOUT,NUMREP,LINCNT,ICBCNT
      INTEGER SAFNUM,DEFSUR,LSTCTY,SSF,SSFCNT,NEDSID,COL,ROW,SAF,
     1      NGRID,NOWCTY,SAFCNT,SAFSUM,OUTCNT,I,J,OLDSUM,DIF,NRMCNT,
     2      SUBCNT,CTYCNT,NUMCOF,NUMSSF,NUMSAF,NUMOUT,NUMREP,LINCNT
C
C-----DEFINE FILE CHANNELS AND INITIALIZE COUNTERS
C
      NUMCOF=5
      NUMSSF=4
      NUMSAF=3
      NUMREP=6
      NUMOUT=15
      ICBCNT=0
      SUBCNT=0
      NRMCNT=0
      OUTCNT=0
      SAFCNT=1
      SSFCNT=1
      LINCNT=0
      LSTCTY=999999
C
C-----WRITE FIRST REPORT HEADER
C
      CALL HEADER
C
C-----READ CONTROL OPTIONS FILE(COF)
C
      CALL INCOF
C
C-----READ SURROGATE SELECTIONS FILE(SSF)
C
      CALL INSSF
C
C-----READ SPATIAL ALLOCATION FACTOR FILE(SAFF), 1 COUNTY
C
  200 CALL INSAF
C
C-----QA SPATIAL ALLOCATION FACTORS
C
      CALL QASAF
C
C-----WRITE RECORDS TO OUTPUT FILE
C
      CALL OUTSAM
C
C-----ADVANCE COUNTY COUNTER
C
      CTYCNT=CTYCNT+1
C
C-----CHECK FOR LAST COUNTY IN FILE, IF TRUE, TERMINATE PROGRAM
C
      IF(NEDSID-LSTCTY) 200,500,200
C
C-----TERMINATE PROGRAM
C
  500 WRITE(NUMREP,510) SAFNUM,LSTCTY,DEFSUR,SSFCNT,SAFCNT,CTYCNT,
     1                    OUTCNT,SUBCNT,NRMCNT,ICBCNT
      STOP
  510 FORMAT ('1',38X,15('*'),' SAFP SUMMARY STATISTICS ',15('*')//
     1        46X,'CONTROL OPTIONS FILE:',8X,'SURROGATES: ',I2/74X,
     2        'LAST COUNTY: ',I6/68X,'DEFAULT SURROGATE: ',I2//41X,
     3        'SURROGATE SELECTIONS FILE:',8X,'CATEGORIES: ',I3//43X,
     4        'SPATIAL ALLOCATION FILE: ',11X,'RECORDS: ',I6/77X,
     5        'COUNTIES: ',I5//55X,'OUTPUT FILE: ',11X,'RECORDS: ',I7//
     6        56X,'PROCESSING:',5X,'SUBSTITUTIONS: ',I6/71X,
     7        'NORMALIZATIONS: ',I6,/73X,'COMBINATIONS: ',I6,//
     8        39X,55('*')/'1')
C
C-----END OF MAIN PROGRAM
C
      END
C     *******************
       SUBROUTINE HEADER
C     *******************
C
C-----WRITE HEADER TO PRINTER
C
      WRITE(6,850)
  850 FORMAT('1',54X,'SAFP PROCESSING MESSAGES'//)
C
C-----END OF SUBROUTINE HEADER
C
      RETURN
      END
C     ******************
      SUBROUTINE INCOF
C     ******************
C
C-----SPECIFICATION STATEMENTS
C
      COMMON SAFNUM,DEFSUR,LSTCTY,SSF(200,2),SSFCNT,NEDSID,COL(160),
     1       ROW(160),SAF(160,30),NGRID,NOWCTY,SAFCNT,SAFSUM,OUTCNT,
     2       I,J,OLDSUM,DIF,NRMCNT,SUBCNT,CTYCNT,NUMCOF,NUMSSF,NUMSAF,
     3       NUMOUT,NUMREP,LINCNT,ICBCNT
      INTEGER SAFNUM,DEFSUR,LSTCTY,SSF,SSFCNT,NEDSID,COL,ROW,SAF,
     1       NGRID,NOWCTY,SAFCNT,SAFSUM,OUTCNT,I,J,OLDSUM,DIF,NRMCNT,
     2       SUBCNT,CTYCNT,NUMCOF,NUMSSF,NUMSAF,NUMOUT,NUMREP,LINCNT
C
C-----INPUT DATA FROM CONTROL OPTIONS FILE
C
      READ(NUMCOF,15) SAFNUM,DEFSUR
   15 FORMAT(I2,1X,I2)
C
C-----CHECK DATA
C
      IF(30-SAFNUM) 50,25,25
   25 IF(30-DEFSUR) 50,30,30
C
C-----BAD DATA
C
   50 WRITE(NUMREP,55)
   55 FORMAT('0','ERROR IN CONTROL FILE VALUES'/'0')
      STOP
C
C-----END OF SUBROUTINE INCOF
C
   30 RETURN
      END
C     ******************
       SUBROUTINE INSSF
C     ******************
C
```

```
C-----SPECIFICATION STATEMENTS
C
      COMMON SAFNUM,DEFSUR,LSTCTY,SSF(200,2),SSFCNT,NEDSID,COL(160),
     1         ROW(160),SAF(160,30),NGRID,NOWCTY,SAFCNT,SAFSUM,OUTCNT,
     2         I,J,OLDSUM,DIF,NRMCNT,SUBCNT,CTYCNT,NUMCOF,NUMSSF,NUMSAF,
     3         NUMOUT,NUMREP,LINCNT,ICBCNT
      INTEGER SAFNUM,DEFSUR,LSTCTY,SSF,SSFCNT,NEDSID,COL,ROW,SAF,
     1         NGRID,NOWCTY,SAFCNT,SAFSUM,OUTCNT,I,J,OLDSUM,DIF,NRMCNT,
     2         SUBCNT,CTYCNT,NUMCOF,NUMSSF,NUMSAF,NUMOUT,NUMREP,LINCNT
C
C-----INPUT DATA FROM SURROGATE SELECTION FILE
C
  115 READ(NUMSSF,125,END=175) SSF(SSFCNT,1),SSF(SSFCNT,2)
      IF(30-SSF(SSFCNT,2)) 150,135,135
  135 SSFCNT=SSFCNT+1
      GOTO 115
  125 FORMAT(I5,1X,I2)
C
C-----BAD DATA
C
  150 WRITE(NUMREP,155) SSFCNT
  155 FORMAT('0','INVALID SURROGATE AT RECORD #: ',I3/'0')
      STOP
C
C-----END OF SUBROUTINE INSSF
C
  175 SSFCNT=SSFCNT-1
      RETURN
      END
C     ******************
       SUBROUTINE INSAF
C     ******************
C
C-----SPECIFICATION STATEMENTS
C
      COMMON SAFNUM,DEFSUR,LSTCTY,SSF(200,2),SSFCNT,NEDSID,COL(160),
     1         ROW(160),SAF(160,30),NGRID,NOWCTY,SAFCNT,SAFSUM,OUTCNT,
     2         I,J,OLDSUM,DIF,NRMCNT,SUBCNT,CTYCNT,NUMCOF,NUMSSF,NUMSAF,
     3         NUMOUT,NUMREP,LINCNT,ICBCNT
      INTEGER SAFNUM,DEFSUR,LSTCTY,SSF,SSFCNT,NEDSID,COL,ROW,SAF,
     1         NGRID,NOWCTY,SAFCNT,SAFSUM,OUTCNT,I,J,OLDSUM,DIF,NRMCNT,
     2         SUBCNT,CTYCNT,NUMCOF,NUMSSF,NUMSAF,NUMOUT,NUMREP,LINCNT
      NGRID=1
C
C-----INPUT SPATIAL FACTORS FROM 1 COUNTY
C
  205 READ(NUMSAF,210,END=275) NEDSID,COL(NGRID),ROW(NGRID),
     1                          (SAF(NGRID,J),J=1,SAFNUM)
C
C-----ADVANCE COUNTER ,CHECK END OF COUNTY, AND IDENTICAL COL AND ROW
C
      IF(NGRID.EQ.1) NOWCTY=NEDSID
      IF (NOWCTY-NEDSID.NE.0) GOTO 285
      IF(COL(NGRID).EQ.COL(NGRID-1).AND.ROW(NGRID).EQ.ROW(NGRID-1))
     1 GOTO 290
      NGRID=NGRID+1
      IF (NGRID.GT.212) THEN
         WRITE(6,1213)
         STOP
      END IF
 1213 FORMAT(////'                 *******  ERROR  *******'
     $ //' NGRID TOO LARGE: INCREASE ARRAY DIMENSIONS')
C
      SAFCNT=SAFCNT+1
      GOTO 205
  210 FORMAT(I6,2(I4),30(I4))
```

```
C
C-----END OF SUBROUTINE INSAF
C
  275 LSTCTY=NEDSID
  285 NGRID=NGRID-1
      BACKSPACE NUMSAF
      RETURN
C
C-----SAME ROW AND COL WITHIN COUNTY-ADD TOGETHER(NOT POP AND HSG)
C
  290 DO 295 JJ=3,SAFNUM
        SAF(NGRID-1,JJ)=SAF(NGRID-1,JJ)+SAF(NGRID-1,JJ)
        IF(SAF(NGRID,JJ).GT.9999) SAF(NGRID,JJ)=9999
  295 CONTINUE
      ICBCNT=ICBCNT+1
      CALL REPORT
      WRITE(NUMREP,296) NOWCTY,COL(NGRID-1),ROW(NGRID-1)
  296 FORMAT(48X,I6,' COMBINED AT COLUMN ',I4,',ROW ',I4)
      GOTO 205
      END
C     ******************
       SUBROUTINE QASAF
C     ******************
C
C-----SPECIFICATION STATEMENTS
C
       COMMON SAFNUM,DEFSUR,LSTCTY,SSF(200,2),SSFCNT,NEDSID,COL(160),
     1       ROW(160),SAF(160,30),NGRID,NOWCTY,SAFCNT,SAFSUM,OUTCNT,
     2       I,J,OLDSUM,DIF,NRMCNT,SUBCNT,CTYCNT,NUMCOF,NUMSSF,NUMSAF,
     3       NUMOUT,NUMREP,LINCNT,ICBCNT
      INTEGER SAFNUM,DEFSUR,LSTCTY,SSF,SSFCNT,NEDSID,COL,ROW,SAF,
     1       NGRID,NOWCTY,SAFCNT,SAFSUM,OUTCNT,I,J,OLDSUM,DIF,NRMCNT,
     2       SUBCNT,CTYCNT,NUMCOF,NUMSSF,NUMSAF,NUMOUT,NUMREP,LINCNT
C
C-----ADD SPATIAL FACTORS FOR EACH SURROGATE. SUBSTITUTE OR
C       NORMALIZE IF NEEDED.
C
      DO 420 J=1,SAFNUM
      DO 410 I=1,NGRID
        SAFSUM=SAFSUM+SAF(I,J)
  410 CONTINUE
      IF(SAFSUM.EQ.0) CALL SUBPOP
      IF(SAFSUM.LT.9500.OR.SAFSUM.GT.10500) CALL NORMAL
      SAFSUM=0
  420 CONTINUE
C
C-----END OF SUBROUTINE QASAF
C
      RETURN
      END
C     *******************
       SUBROUTINE NORMAL
C     *******************
C
C-----SPECIFICATION STATEMENTS
C
       COMMON SAFNUM,DEFSUR,LSTCTY,SSF(200,2),SSFCNT,NEDSID,COL(160),
     1       ROW(160),SAF(160,30),NGRID,NOWCTY,SAFCNT,SAFSUM,OUTCNT,
     2       I,J,OLDSUM,DIF,NRMCNT,SUBCNT,CTYCNT,NUMCOF,NUMSSF,NUMSAF,
     3       NUMOUT,NUMREP,LINCNT,ICBCNT
      INTEGER SAFNUM,DEFSUR,LSTCTY,SSF,SSFCNT,NEDSID,COL,ROW,SAF,
     1       NGRID,NOWCTY,SAFCNT,SAFSUM,OUTCNT,I,J,OLDSUM,DIF,NRMCNT,
     2       SUBCNT,CTYCNT,NUMCOF,NUMSSF,NUMSAF,NUMOUT,NUMREP,LINCNT
  800 OLDSUM=SAFSUM
      SAFSUM=0
      IOVER=0
```

```
C
C-----NORMALIZE SAF'S FOR SURROGAET I, AND WRITE MESSAGE TO REPORT
C
      DIF-(10000-OLDSUM)/NGRID
      DO 820 I-1,NGRID
        SAF(I,J)-SAF(I,J)+DIF
C
C-----CHECK IF NORMALIZED FACTOR LESS THAN 0
C
      IF (SAF(I,J).GE.0) GOTO 810
      SAF(I,J)-IABS(SAF(I,J))
      IOVER-IOVER+SAF(I,J)
  810 SAFSUM-SAFSUM+SAF(I,J)
  820 CONTINUE
      IF (IOVER.GT.100) GOTO 800
      NRMCNT-NRMCNT+1
      CALL REPORT
      WRITE(NUMREP,840) NOWCTY,J
  840 FORMAT(48X,I6,'NORMALIZED FOR SURROGATE ',I2)
C
C-----END OF SUBROUTINE NORMAL
C
      RETURN
      END
C     *******************
       SUBROUTINE SUBPOP
C     *******************
C
C-----SPECIFICATION STATEMENTS
C
       COMMON SAFNUM,DEFSUR,LSTCTY,SSF(200,2),SSFCNT,NEDSID,COL(160),
     1       ROW(160),SAF(160,30),NGRID,NOWCTY,SAFCNT,SAFSUM,OUTCNT,
     2       I,J,OLDSUM,DIF,NRMCNT,SUBCNT,CTYCNT,NUMCOF,NUMSSF,NUMSAF,
     3       NUMOUT,NUMREP,LINCNT,ICBCNT
      INTEGER SAFNUM,DEFSUR,LSTCTY,SSF,SSFCNT,NEDSID,COL,ROW,SAF,
     1       NGRID,NOWCTY,SAFCNT,SAFSUM,OUTCNT,I,J,OLDSUM,DIF,NRMCNT,
     2       SUBCNT,CTYCNT,NUMCOF,NUMSSF,NUMSAF,NUMOUT,NUMREP,LINCNT
      OLDSUM-SAFSUM
      SAFSUM-0
C
C-----SET CURRENT FACTORS TO DEFAULT FACTORS, READ AND NORMALIZE
C       IF NECESSARY, WRITE MESSAGE FOR PROCESSING.
C
      DO 720 I-1,NGRID
        SAF(I,J)-SAF(I,DEFSUR)
        SAFSUM-SAFSUM+SAF(I,J)
  720 CONTINUE
      SUBCNT-SUBCNT+1
      IF(SAFSUM.LT.9500.OR.SAFSUM.GT.10500) CALL NORMAL
C
C-----END OF SUBROUTINE SUBPOP
C
      RETURN
      END
C     *******************
       SUBROUTINE REPORT
C     *******************
C
C-----SPECIFICATION STATEMENTS
C
       COMMON SAFNUM,DEFSUR,LSTCTY,SSF(200,2),SSFCNT,NEDSID,COL(160),
     1       ROW(160),SAF(160,30),NGRID,NOWCTY,SAFCNT,SAFSUM,OUTCNT,
     2       I,J,OLDSUM,DIF,NRMCNT,SUBCNT,CTYCNT,NUMCOF,NUMSSF,NUMSAF,
     3       NUMOUT,NUMREP,LINCNT,ICBCNT
      INTEGER SAFNUM,DEFSUR,LSTCTY,SSF,SSFCNT,NEDSID,COL,ROW,SAF,
     1       NGRID,NOWCTY,SAFCNT,SAFSUM,OUTCNT,I,J,OLDSUM,DIF,NRMCNT,
     2       SUBCNT,CTYCNT,NUMCOF,NUMSSF,NUMSAF,NUMOUT,NUMREP,LINCNT
C
C-----CHECK LINE COUNTER, IF EQ 50 PRINT HEADER AND FOOTER.
C
      LINCNT=LINCNT+1
      IF(LINCNT.LT.50) RETURN
      CALL HEADER
      LINCNT=0
C
C-----END OF SUBROUTINE REPORT
C
      RETURN
      END
C     *******************
       SUBROUTINE OUTSAM
C     *******************
C
C-----SPECIFICATION STATEMENTS
C
       COMMON SAFNUM,DEFSUR,LSTCTY,SSF(200,2),SSFCNT,NEDSID,COL(160),
     1       ROW(160),SAF(160,30),NGRID,NOWCTY,SAFCNT,SAFSUM,OUTCNT,
     2       I,J,OLDSUM,DIF,NRMCNT,SUBCNT,CTYCNT,NUMCOF,NUMSSF,NUMSAF,
     3       NUMOUT,NUMREP,LINCNT,ICBCNT
      INTEGER SAFNUM,DEFSUR,LSTCTY,SSF,SSFCNT,NEDSID,COL,ROW,SAF,
     1       NGRID,NOWCTY,SAFCNT,SAFSUM,OUTCNT,I,J,OLDSUM,DIF,NRMCNT,
     2       SUBCNT,CTYCNT,NUMCOF,NUMSSF,NUMSAF,NUMOUT,NUMREP,LINCNT
C
C-----OUTPUT 1 RECORD FOR EACH AREA SOURCE CATEGORY. CHOOSE CORRECT
C       SPATIAL FACTORS USING SURROGATE SELECTION FILE
C
      DO 640 J=1,SSFCNT
        WRITE(NUMOUT,650) NOWCTY,SSF(J,1),NGRID,(COL(I),ROW(I),
     1                 SAF(I,SSF(J,2)),I=1,NGRID)
        OUTCNT=OUTCNT+1
  640 CONTINUE
  650 FORMAT(I6,I5,I3,212(I4,I4,I4))
C
C-----END OF SUBROUTINE OUTSAM
C
      RETURN
      END
```